FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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EDITORIAL COMMENT.

The Work of Aircraft in the War.

Since we wrote last week, certain facts have emerged from the fog of war which will assist us somewhat in appraising the work and value of aircraft. Such of these facts as have become known are, it must be admitted, not of decisive importance, and it will not do, therefore, to attempt to base any definite judgment upon them. In the main, the records are simply those of isolated acts on the part of individuals which have not had any real effect on the issues of battles. So far as concerns the correlated work of aircraft to the larger aspects of the vast operations now taking place on the Continent of Europe, we still remain absolutely in the dark.

If we consider first those larger aspects of which we have spoken, there is some first-sight reason for the presumption which has been voiced—always keeping in mind that there is nothing but pure assumption to go upon—that aircraft have not fulfilled the high expectations formed of them. It is by now pretty generally admitted that the French initial strategy was entirely at fault, and failed completely to realise that the main blow of the German legions was to be delivered through Belgium by way of the French northern frontier. It seems, on the face of it, that the Germans succeeded in deceiving their enemies by the very elementary deceptive device of telling them the truth. For years past high German military authorities have stated plainly, and without reserve, that this way the stroke would be made, with the, perhaps, not unnatural result that the French General Staff have looked for it elsewhere. But whatever the underlying causes, there is not the slightest room for doubt that our Allies were taken by surprise.

Expert writers on the war have shown some inclination to blame the French air service for the want of proper information regarding the massing of the German armies in the north, and at first sight it certainly does look as though the new arm had, to say the least, proved less effective than might have been expected, but we must always remember that we are completely ignorant of facts on which to base such a judgment, save and except the grand failure of our Allies to appreciate the real position which was developing in Belgium. Now, before the experts proceed to their condemnation of the aerial services, they might first make certain of how and where the French aircraft were employed. Were they, in fact, employed in sufficient numbers on the Franco-Belgian frontier at all? We do not know. Or were the French Staff so magnetised by the "lost provinces" and so obsessed by the belief that the Germans had consistently lied about their intentions that they concentrated all their attention on the East?

Again we have no exact knowledge to guide us, though at least we have enough to give us to think that this was quite possibly the case. Now, if the bulk of the French air service was employed in the East on the mission of looking far afield for a German concentration which was not there for them to see, it was obviously impossible for them to see what was happening in the more important area. Rather than blame the French airmen, we should ascribe their comparative failure to a grave miscalculation of the probabilities on the part of the General Staff. As, however, we have nothing but pure hypothesis to go upon, the only safe course is to suspend judgment until something concrete emerges.

Turning from the major to the minor aircraft operations of the war, we know now that considerable activity has been displayed by both sides. First, as regards airships, we recorded last week that one of the vaunted Zeppelins had passed by night over Antwerp on a mission of cold-blooded murder, dropping powerful bombs, which killed and wounded several inoffensive civilians and—one of the ironies of war—destroyed busts of both the Kaiser and Bismarck. Beyond this, the German airships have achieved little, so far as we know. On the other side, French airships are said to have carried out valuable

reconnaissance work, while one of the British naval airships is reported to have been seen over Ostend.

More has, naturally, been heard of the exploits of the aeroplanes. The Germans appear to have employed them with considerable success in their attack on the British army at Wasmes, near Mons, where it is said they flew over the British lines and signalled the ranges to their artillery by means of discs. What the exact method of signalling was does not seem to be quite clear, but all accounts agree that whatever it was it was singularly effective. We are not told what countermeasures were adopted by our own commanders, nor what use was made of our aircraft. As a matter of fact, if the reports of eye-witnesses are to be trusted, we do not appear to have made use of our aeroplanes in the battle area itself, though we should not too hastily assume that, since the reports of those who have just emerged from a hotly contested action are notoriously unreliable. At least one of these German range-checking aeroplanes seems to have been brought down by the British gunners. The seaplane, too, has made its first appearance in war, for it is said that it was one of these craft which conveyed the news of the attack of the British Squadron in the Bight of Heligoland to the forts.

Then, the Germans seem to be employing aeroplanes in their campaign of terrorising peaceful civilians, for several of these craft have flown over Paris and dropped bombs on hospitals and other non-military buildings, though the damage done appears to have been comparatively slight, and there is reason to believe that the marauders were made to pay the extreme penalty for their audacity, for they were chased by superior numbers of French aeroplanes, and in the words of the official despatches "were probably overtaken and destroyed. In the operations round Charleroi, the Germans seem to have employed their aeroplanes with success for the transmission of orders to the troops.

On the side of the Allies very little has been allowed to transpire, and of the doings of the R.F.C. in particular we are entirely ignorant. According to one report, Capt. Waldron flew into Namur before its fall, damaging his machine in landing, and was compelled to leave by car just before the German entry into the town. Then we had a picturesque story of how a British airman came plump on a German machine as he emerged from a cloud, and engaged his enemy in a revolver duel which ended in the death of the German. On Tuesday last a French aviator flew high over Brussels, dropping cheering messages to the citizens, and by way of showing his contempt for the shooting of the Germans who were trying to bring him down, gave an exhibition of upside-down flying! Magnificent, if true, but hardly war.

Where does all this lead us? So far as we are able to discern, there is nothing in the records that is particularly helpful. This much may be gathered, however, that aircraft as a means of attack have not been conspicuously successful. True, we have had a report that a German battery was captured by the French after the gun-teams had been wiped out by a hail of bombs dropped from aeroplanes, but we are very inclined to receive such stories with scepticism until more definitely official information is to hand. So far as we are able to go, it appears that the opinions we have expressed consistently, long before the war broke out to confirm or confute theories, that the main use of aircraft in war must be for reconnaissance, and not for offensive operations have been fully confirmed by what has actually happened. Admitted that we know very little of what has been taking place, it must equally be remembered that it is possible to deduce a lot from what we do not hear. Thus, we have not heard of any material success achieved by attacking aircraft, and, as we have heard of their failures, we must assume that had such successes been actually achieved, we must equally have been told. That is as far as the information at hand enables us to go on this present occasion.

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THE ROYAL FLYING CORPS.

THE following appointment was announced in the *London Gazette* of the 25th ult. :—

Royal Flying Corps.—Commander-Colonel (temporary Brigadier-General) Sir D. Henderson, K.C.B., D.S.O.

The following appointments of Royal Flying Corps Officers were also announced in the *London Gazette* of the 25th ult. :—

General Staff.—The following to be General Staff Officers, 1st Grade :—Brevet Major (temporary Lieutenant-Colonel) F. H. Sykes, 15th (the King's) Hussars ; 2nd Grade : Major E. B. Ashmore, M.V.O., Royal Artillery ; Captain W. G. H. Salmond, Royal Artillery.

Adjutant-General's and Quartermaster-General's Staff.—To be a Deputy-Assistant Quartermaster-General : Brevet Major H. R. M. Brooke-Popham, the Oxfordshire and Buckinghamshire Light Infantry.

Attached to Headquarters Staff.—To be a Staff-Captain : Lieutenant B. H. Barrington-Kennett, Grenadier Guards.

The following appointments were announced in the *London Gazette*, issued on the 28th ult. :—

Royal Naval Air Service.—Flight-Lieut. T. R. Cave-Brown-Cave to be Flight Commander (July 1st).

R.F.C.—Military Wing.—*Supplementary to Regular Corps.*—The following Second Lieuts. are confirmed in their rank :—A. Payze, F. P. Adams, A. L. Russell, A. A. B. Thomson, L. A. Strange.

The following appointment was announced in a supplement to the *London Gazette*, issued on the 29th ult. :—

R.F.C.—Military Wing.—Sergeant-Major Albert Fletcher to be Quartermaster, with the hon. rank to Lieutenant. August 30th, 1914.

The following appointments were announced in the *London Gazette* of the 1st inst. :—

R.F.C.—Military Wing.—*Special Reserve of Officers.*—The undermentioned to be Second Lieuts. (on probation). Dated August 29th, 1914: Clifford Alban Hooper, Harold Blackburn, and Francis Conway Jenkins.

The following appointments were announced by the Admiralty on the 1st inst. :—

Royal Naval Air Service.—Squadron-Commander E. N. Gerard, to "President," additional, for special service in the Air Department, August 31st.

Probationary Flight Sub-Lieutenants—J. M. D'Arcy Levy, to the "Pembroke," additional, for course of instruction at the Central Flying School, August 29th.

Tom D. Mackie, to the "Pembroke," additional, for Naval Airship Station, Farnborough, as Flight Lieutenant (E.), for temporary service. August 31st.

The following appointments were announced by the Admiralty on the 2nd inst. :—

Royal Naval Air Service.—Messrs. Claude Grahame-White and Richard T. Gates, to the "Pembroke," additional, as temporary Flight Commanders, for special service, August 10th.

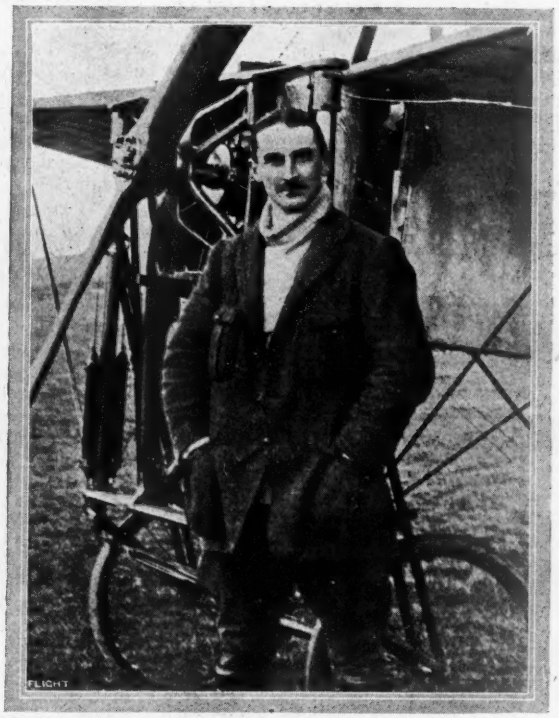
FLIGHT

THE "ROUND BRITAIN" MACHINES.

THE machine officially numbered 5 in the Circuit of Britain, and which was to have been piloted by Mr. F. B. Fowler, was

The E.A.C. Tractor Seaplane.

This machine differs as a type from any of the other machines entered, in that it is a twin-tractor, *fuselage* biplane, although having its engine at the rear of the pilot. Constructionally the *fuselage* does not differ materially from usual practice, being built up of four ash *longerons* connected by struts and cross members of spruce, the whole braced with steel wire in the usual way. In shape, however, the *fuselage* deviates from standard types in that the *longerons* are swept upwards towards the rear in order to provide sufficient water clearance and thus dispense with the necessity of a tail float. In place of the latter member a safety tank is fitted inside the last bay of the *fuselage*. A good streamline is given to the *fuselage* by means of a turtle back and a rounded bottom, whilst the sides have been kept flat, in order, probably, to provide the necessary vertical surface.



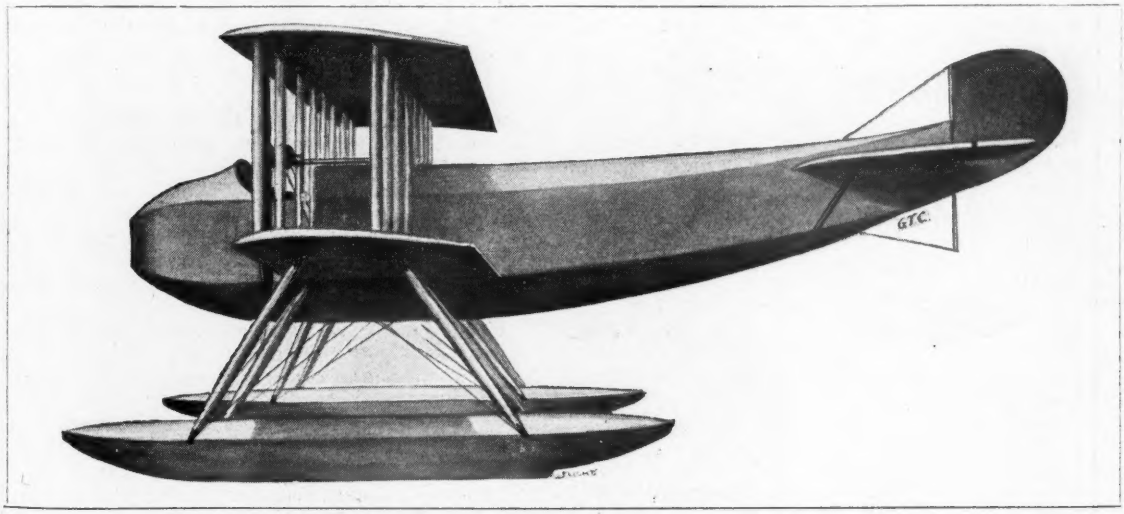
Mr. F. B. Fowler, the pilot who was nominated for the E.A.C. biplane in the Round Britain Race.

In the nose the *fuselage* is rounded to form a good entry for the air, and the turtle back is here swept up to form a wind screen in front of the occupants' seats. These are arranged side by side in a very roomy cockpit, and as they are practically on a level with the leading edge of the wings an exceptionally good view is obtained in a forward and downward direction, whilst the absence of any propeller draught, due to the mounting of the two propellers a considerable distance away from the *fuselage*, renders this machine as comfortable to fly as machines of the usual "pusher" type.

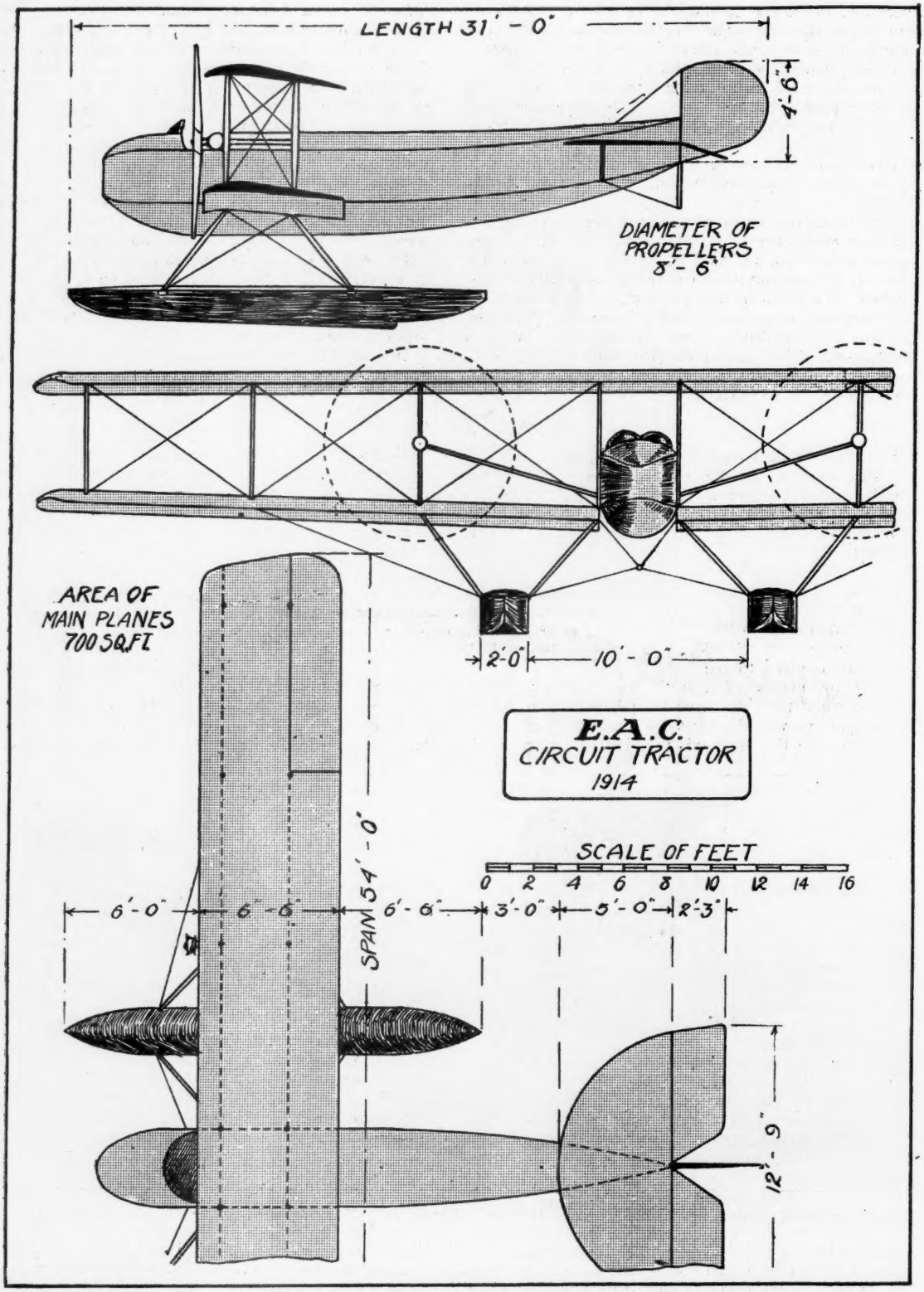
Behind the seats and inside the *fuselage* is situated the engine—a 100 h.p. Green—which drives the two tractors through two inclined shafts and bevel gears.

A special gear-box is attached to the engine, and the shafts, which are enclosed in torque tubes, run from here to other gear-boxes bolted to the two interplane struts that carry the two tractors. Large petrol and oil tanks are provided inside the *fuselage*, and contain a supply sufficient for a flight of seven hours' duration, or 70 gallons of petrol and 6 gallons of oil.

The wings follow standard practice as regards their construction, and are characterised by having their trailing edge slightly longer than the leading edge, as shown in the accompanying plan view of the machine. The upper main plane is straight, whilst the lower one is set at a dihedral angle of 3° for the double purpose of



ROUND BRITAIN MACHINES, No. 5.—The E.A.C. biplane.



ROUND BRITAIN MACHINES, No. 5.—The E.A.C. biplane. Plan, front and side elevations to scale.

increasing the lateral stability of the machine in flight, and to give adequate water clearance when on the surface of the sea. Eight pairs of spruce struts separate the main planes, and cable bracing is employed. Large *ailerons* are fitted to the outer portions of the trailing edge of upper and lower planes. Lateral control is by means of a rotatable hand wheel mounted on a vertical column in front of the pilot. As in practically all modern machines the *ailerons* are interconnected, so that when one is depressed the other is correspondingly elevated.

The tail planes consist of rudder, stabilizing plane, and elevator, whilst no vertical fixed surface is fitted, probably on account of the fact that the *fuselage* is comparatively deep at the rear and thus provides the necessary vertical surface. Should it be found desirable to fit vertical fins this may be easily accomplished, as the stern post of the *fuselage* is extended in both upward and downward directions. The fixed stabilizing plane, which is of roughly semi-circular shape, is attached to the sides of the *fuselage*, and is approximately in line with the propeller shafts. It is braced by steel tubes to the lower *longerons*. To the trailing edge is hinged the divided elevator.

The landing chassis consists of two long floats, each of which is carried on two pairs of struts, one pair running to the lower *longerons* of *fuselage* and the other to the two interplane struts that carry the propellers. To add to the lateral rigidity of the whole structure stay wires are taken outwards to the interplane struts and inwards to the *fuselage*. As the floats are placed so far—12 ft.—apart, it has been found unnecessary to fit any auxiliary floats to the wing tips. The floats themselves are 19 ft. long with a beam of 2 ft., and have a "Vee" bottom in front running into a flat bottom at the rear.

The weight of the machine empty is 1,850 lbs., and fully loaded 2,800 lbs., giving a loading of 4 lbs. per square foot. A maximum speed of 65 m.p.h. is anticipated, whilst it is hoped to bring the minimum speed down to about 45 m.p.h.

In view of the way in which this machine departs from what might be termed standard practice, its trials will be watched with the greatest interest.

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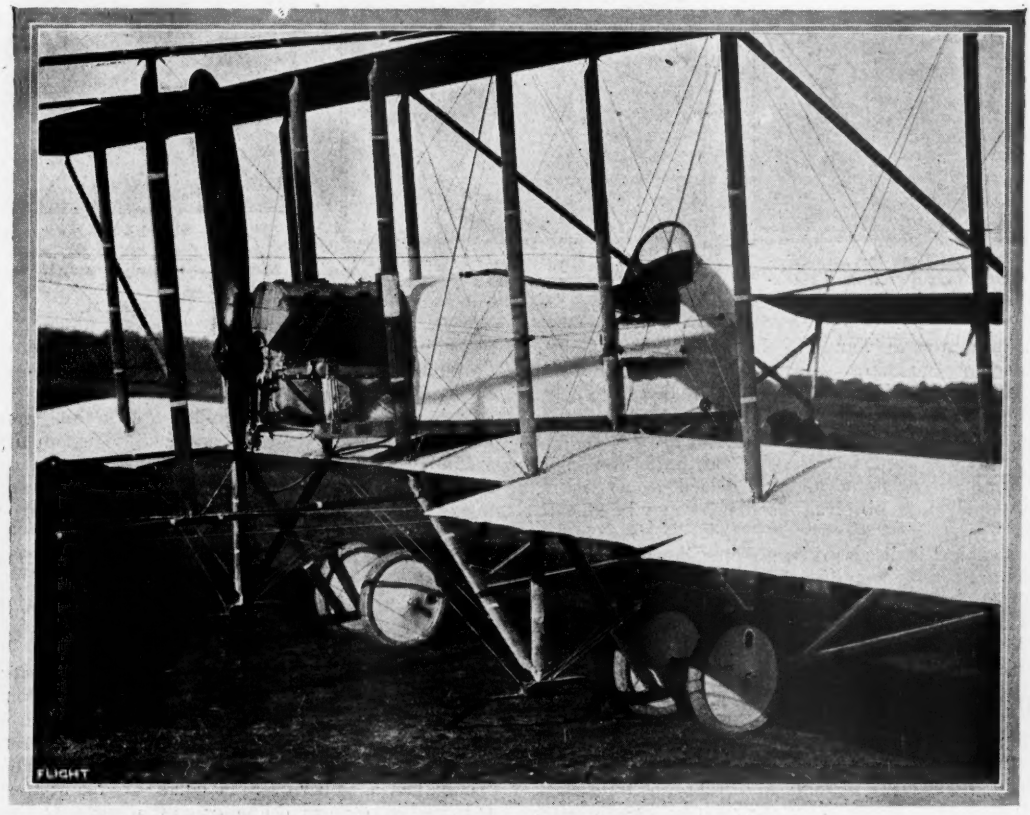
More R.N.A.S. Recruits than Required.

FOLLOWING the notice which appeared in last week's FLIGHT and other papers calling for experienced men for the Royal Naval Air Service, fully 3,000 applications were received, greatly in excess of the number required.

Aerial Volunteers for Germany.

ACCORDING to a report from Copenhagen, the German Government has issued a call for volunteer airmen, and more have come forward than can be accepted. The authorities have taken over all aircraft construction works.



The latest M. Farman biplanes produced by the Aircraft Co. are fitted with *nacelles* of improved design, which add considerably to the comfort of the occupants and reduce head resistance. With this type of *nacelle* the machines are capable of a speed of 65 m.p.h.

STEERING AIRCRAFT AT SEA.

IT is frequently imagined that the principal practical difference between trans-oceanic and cross-country flights is simply one of magnitude—the duration of the flight and the distance to be traversed. Such a conception is, however, erroneous. In aerial transit over water, as over land, it is necessary that the pilot should possess certain information as to the air speed of the machine, the actual speed relative to the earth, the direction of flight, the altitude at which it is made, and the geographical position of the aeroplane at stated intervals. It is also desirable that he should know whether, or not, he is taking the fullest advantage of favourable air currents.

But beyond these factors there exists great dissimilarity in the conditions under which the flights are made, and even in the means whereby the information indicated can be secured. In cross-country flights it is possible, given the necessary skill and judgment in choosing suitable landing places, to descend, almost at any time, for the purpose of verifying one's position, taking up replenishments, or for rest at night. Also, by the use of maps, and by a knowledge of the position of prominent landmarks, an experienced pilot can safely traverse long distances,

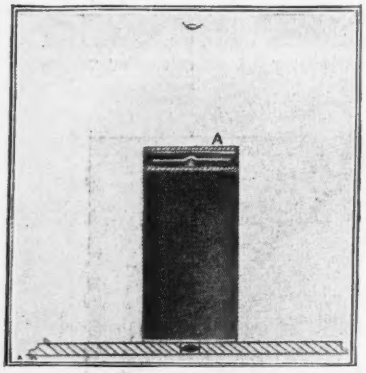


Fig. 1.—Sea focal plate for ascertaining the momentary direction of translation.

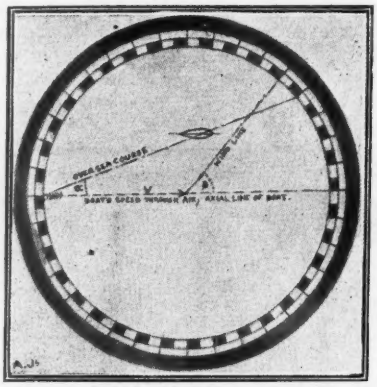


Fig. 2.—Velocity board for determining the momentary speed of the aircraft.

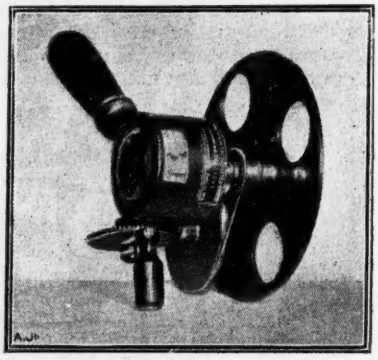


Fig. 3.—Stroboscope suggested for finding the speed of the sea's image across a ground glass, to serve in estimating the oversea speed of the airboat.

often over strange country. In trans-oceanic flights, however, there are no such sources of information when once land is out of sight. Reliance has to be placed upon two sources for information to guide the pilot in directing his course, in order that he can be sure of striking the country towards which he is travelling at the desired point. These are (*a*) communications received from passing vessels, and (*b*) the observations that he may be able to make.

This subject is discussed by a writer in the *Scientific American* in connection with the projected trans-Atlantic flight of Lieut. Porte, and this should be read in conjunction with Mr. Johnson's article on "Finding One's Way in the Air by Means of a Gyroscope," which appeared in FLIGHT on August 21st. He states that in the geographical navigation of an aircraft over the sea there are three conditions to be considered—(1) When only the sea is visible; (2) when only the firmament is visible; and (3) when neither sea nor sky is visible.

"The momentary geographical direction of translation of the craft over the ocean surface, regarded as stationary, may be determined by noticing the apparent line of transit of wavelets or floating objects past the boat, or across the field of an optical instrument therein, such as a camera or telescope. Such passing objects will appear to describe streaks or stripes along the focal plane, especially if the focal length of the objective and the height above the water be so chosen as to cause the images to cross the optical field quickly. If the objects have but slight speed across course, say one per cent. of the boat's speed on her course, the resulting deviation of the stripes may be neglected. By sunlight the distinct objects on the ocean surface, more especially white caps, are usually numerous; by night luminous objects may be projected on to the water, preferably ahead of the aeroplane, and along its true course. Wooden balls coated with potassium will flash on striking the water. Sodium-tailed arrows or flaming torches, cast quickly upon the ocean face and remaining bright for a few seconds, may be used to sight back to, and thus indicate the course as compared with a compass needle. Under favourable conditions, the direction may thus be determined to about one degree. Whatever the visible object, if its image cross the plate quickly, say in one-tenth of a second, it will appear as a stripe or streak all across, and may be determined in direction by comparison with an adjustable line of reference; if it cross slowly its position on entering or leaving the field may be noticed, thus giving the direction approximately."

"Practically, a lens may be inserted in the bottom of the hull and bring the sea's image to focus on a level ground glass above it or on a vertical or oblique plate if an oblique mirror be inserted between the lens and the image plate. Reference lines and a graduated arc on the plate may serve to measure the direction of travel referred to the boat's axis or the needle of a compass. The compass needle can be mounted just under the focal plate, if this be level or reflected upon it, if oblique or vertical. For example, in Fig. 1, the lens, L, may bring the sea face to focus on the frosted plate, A."

"The momentary speed of the flying boat over the water may be determined in many ways. If her altitude be unknown, or disregarded, her speed over the water, and incidentally the wind speed, may be found as shown in Fig. 2. The speed, V, of the boat through air and her inclination, α, to her over-sea course are read; then she is turned into the wind line, or so that wavelets seem to move fore and aft, and the angle, β, of her turn is noted on the compass. From these three observations a

triangle is determined giving the over-water speed of the boat, and incidentally the true wind speed. To simplify the process, transparent millimetre scales pivoted at the ends of V in the diagram can be set at the angles, α β, and read at their crossing to give, in terms of V, the over-water speed of wind and boat. Thus if V be 100 millimetres, and 40 be read on the wind scale at the crossing, the wind speed is 40 per cent. of the boat's observed speed through air. The scales can be read truly to less than 1 per cent.; the speed, V, to 1 per cent., more or less; the angles, α β, to about one degree."

"If the boat's altitude be known, her over-water speed may be found from the speed of the ocean's image moving across the field in an optical instrument, say a camera or telescope, or the sea focal plate just described, which, with the keel lens, is the equivalent of a camera. If this plate be large, and the altitude of flight be considerable, the period of transit of the image of a well-defined sea object can be taken with a stop-watch truly to 1 or 2 per cent. On a horizontal image plate the image speed is constant if the over-sea speed be constant. Hence the speed of travel of the image, multiplied by the ratio of the distances respectively from lens to sea and from lens to plate, gives the boat's over-sea speed. This ratio may be made some easy multiplier, say 100, by suitably adjusting those two lens distances. If the angular displacement through 45 degrees be taken with a rotating telescope or camera, and timed with a stop-watch, the over-sea velocity equals the boat's altitude divided by the observed time."

If, however, the sea's image crosses the plate or field of view too quickly its speed may be found (*a*) by halting the image, by viewing it through a stroboscope or in a mirror rotating backwards, or (*b*) by diverting the image, as by causing the said rotation to occur perpendicular to the path of the image, so that its lateral speed may be proportional to its direct speed, thus making the image travel at an angle to its natural course across the plate.

When the ocean face is too thickly fogged, a light line may be dropped into the sea and paid out while trailing due fore and aft of the boat temporarily turned into the wind line. Thus observations of the log line and compass give the boat's over-sea velocity in the line of wind, and from this and the observed speed through the air, by using the velocity board shown in Fig 2, the pilot can immediately turn the aircraft on to the desired course and read off her over-sea speed along this course.

"The hourly speed and course can be found by astronomical means familiar to the marine navigator. The pilot can, with his watch and sextant, read respectively the time of day and the altitude of two heavenly bodies, say the pole star and another one, and from these data, by aid of his astronomical tables, he can determine his geographical position, *i.e.*, his latitude and longitude. The change of position from hour to hour determines his course and hourly speed.

"In practice several devices are available for finding the altitude or the zenith distance of a heavenly body. If the sea be clear the sextant's telescope, held freely in hand, is pointed straight at the horizon, while the angular distance of the heavenly body is measured with the sextant index. Ordinary swaying of the craft will not thwart this. In case the flight be moderately high, a correction can be made for the consequent depression of the horizon; if very high, the horizon blurs or disappears. With a clear horizon, an expert navigator can, it is claimed, thus locate his position on the globe truly to one mile or one minute of arc.

"Another device is to use an artificial horizon. Astronomers measure the angle between the star and its image reflected from the surface of still mercury, and divide by two to get the true altitude. This method is available on land at any elevation and without clearness of horizon. To apply it in an air-craft the mercury would have to be supported so as to remain level and smooth. In lieu of mercury a rigid plane reflector kept horizontal may be used, say a polished plate floating on a liquid, or supported on gimbals. Also a polished plate fixed to the aeroplane frame, and kept level for the moment by the aviator, who can usually choose a favourable atmosphere several times a day, and hold his craft level to within less than one degree by means of the controls and inclinometers." "Greater accuracy, however, is claimed for the sextant and plumb-line. By this combination experienced seamen claim to be able to locate their position truly to three miles, or three minutes of arc."

"A third device is to focus the sky on a graduated chart placed vertically under a lens, the chart and lens being rigidly mounted on a frame so supported as to maintain their proper poise either automatically or steadied by the observer."

"The zenith star or point of the sky can be focussed on the centre of the chart, and the other stars will have their images at distances from the chart centre or zenith image, which are measurable on the chart itself by suitable graduations. The chart can be either plane or spherical, say, concave upward like a dish, and the graduations for zenith distance can be made accordingly. If the centre of the plane or concave chart be called the pole, lines radiating from it mark the longitude referred to it; circles about the pole space off the latitude. The positions of any two stars on this chart, preferably at some distance from the zenith, enable the navigator, by use of his watch and tables, to determine his true geographical position. The sea image plate, already described, if suitably enlarged, may serve for the plane sky chart here considered, provided the sky lens be chosen of the right focal length."

In case the sky be long obscured, the pilot may compute his position from his continuous record of speed and direction since last taking his position with the sextant. An exellent method, if applied without excessive weight, would be to use two gyroscopic compasses; the first, set parallel to the earth's axis, indicating true north and the latitude, and the second, set perpendicular to the earth's axis, indicating the longitude. The pilot, by plotting his course from frequent readings of this apparatus, would have a good indication of his average momentary progress over sea, and thence could correct his steering or find the average wind velocity by the use of the velocity board.

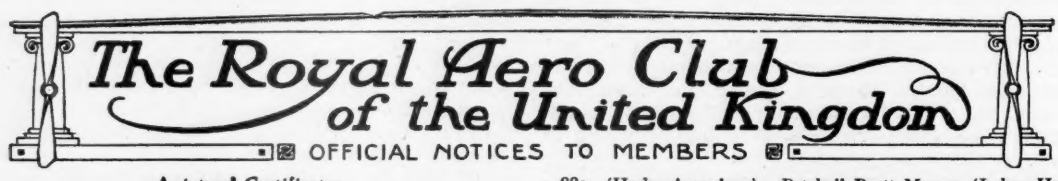
The ordinary gyrostatic compass is graduated to single degrees, and may be read to about one quarter of a degree, or 15 miles. Such a check on the drifting of aircraft at sea, would, in the present state of the art, be very satisfactory, especially in fog and darkness.

Unaided observation of the waves enables an experienced navigator to judge the direction of the wind truly to within 10 degrees and its speed truly to 30 per cent. With equal or greater accuracy the skilled aviator can judge his oversea direction and speed by mere inspection of the passing water near at hand.

"As we have seen, the errors in direction when steering with the compass, aided by instruments for estimation of wind velocity, can, under fair conditions, be kept

well under 5 or 10 degrees. Suppose, however, that the wind be judged by the eye alone; say the speed truly to 30 per cent., the direction truly to 10 per cent; what then is the likely range of error in steering by compass an air craft having a natural speed of 60 miles an hour? As a particular case, suppose a wind of 20 miles an hour blow squarely across her desired course. The pilot, misjudging the wind speed by 30 per cent., will think it six miles faster or slower than it really is. When he has pointed his course to the best of his ability he will be advancing towards his goal at 60 miles an hour and drifting sideways six miles an hour. The error in steering is thus an angle whose tangent is one-tenth or an angle of $5\frac{3}{4}°$. The lengthening of course due to this error is about one half of one per cent., and the drift off course about 60 miles in a voyage of 600 miles. If the whole direct course be 1,200 miles, and no correction for drift be made during the first half of the voyage, this half is lengthened out by the error to the extent of about half a per cent. of 600 miles, or about three miles.

"From the foregoing discussion of the navigating devices and of the consequences of error in steering, it appears that no grave evil is to be expected from steering over any length of sea course terminating on a liberal coast line, say of 2°, or 120 nautical miles, provided that a powerful and long-sustained storm be not encountered."



Aviators' Certificates.

THE following Aviators' Certificates have been granted :—

878 Engine Room Artificer John Watson Jean, R.N. (Maurice Farman Biplane, Central Flying School, Upavon). Aug. 19th, 1914.

879 Flight Sub-Lieut. James Douglas Maude, R.N. (Maurice Farman Biplane, Central Flying School, Upavon). Aug. 19th, 1914.

880 Richard Cecil Hardstaff (E.A.C. Biplane, Eastbourne School, Eastbourne). Aug. 20th, 1914.

881 (Hydro-Aeroplane). Petchell Burtt Murray (Lakes Hydro-Biplane, Lakes Flying School, Windermere). Aug. 21st, 1914.

882 William Orchard Usher Purnell (Henry Farman type Biplane, Pashley School, Shoreham). Aug. 21st, 1914.

883 Master Mariner Richard Upton (Grahame-White Biplane, Grahame-White School, Hendon). Aug. 26th, 1914.

HAROLD E. PERRIN, Secretary.

166, Piccadilly, W.

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Eastchurch Flying Grounds.

Naval Flying.—There has again been quite a great deal of flying during the week, the following machines being up nearly every day: Maurice Farman, Bristol tractor, 1, 2, 10, 63 Shorts, Deperdussin. Flight-Commander McClean's machines left for service on Thursday, the transport on motor cars, 1 machine on Friday. Short Bros. despatched another seaplane to Isle of Grain for Admiralty.

Capt. R. Upton, who has passed for his *brevet* at the Grahame-White Aviation School at Hendon.

Civilian Flying.—Mr. Alec Ogilvie made several flights during the week on his 35 Wright.

Brighton-Shoreham Aerodrome.

Pashley Bros. and Hale School.—Instructors last week :—E. and C. Pashley and Hale. Up with instructor :—C. Winchester, Mrs. Vincent. Straights alone :—Mrs. Vincent. Circuits and eights :—E. Roberts, C. Rutlen, J. Woodhouse, C. Winchester. Certificate :—E. Roberts

Mr. F. Courtney, who has recently passed his test for the Royal Aero Club certificate at the Grahame-White School, Hendon.

passed the *brevet* tests on Saturday with a perfect glide right on the mark.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Instructors for last week, Messrs. Manton, Merriam, Lowe, Russell, Shepherd and Winter.

Monday, Messrs. Allen, Giles, Perry and Strong rolling with instructor. Messrs. Carabajal, Easter, Hawkins, Mumby, Riggall, Rosher, Stalker, Strickland, Vere and Whitehead, straights with instructor. Mr. Crowe, solo straights. Capt. Upton, solo circuits.

Tuesday, Messrs. Allen, Carabajal, Easter, Haines, Hawkins, Vere, Whitehead, straights with instructor. Mr. Wiles, solo straights. Captain Upton first part of *brevet* tests.

Wednesday, Mr. Polehampton (new pupil), passenger flight. Messrs. Carabajal, Giles, Morgan, Perry, Riggall, Rosher, Strickland, Strong and Stalker, straights with instructor. Captain Upton, second part of *brevet* tests.

Thursday, Messrs. Carabajal, Giles, Vere, Whitehead, Allen, Strong, Hawkins, Morgan, Mumby, Stalker and Strickland, straights with instructor. Mr. Crowe, solo straights. Mr. Wiles, circuits with instructor.

Friday, Messrs. Perry, Polehampton, Allen, Carabajal, Easter, Lister, Giles, Haines, Morgan, Mumby, Riggall, Stalker, Strong, and Vere, straights with instructor. Mr. Strickland, straights alone, also Mr. Whitehead. Mr. Wiles passenger flight, practising *vol planing*.

Saturday, Messrs. Carabajal, Giles, Morgan, Riggall, Rosher and Stalker straights with instructor. Messrs. Crowe and Strickland, solo straights.

Beatty School.—Pupils being instructed last week by Mr. Geo. W. Beatty on dual control biplane. Monday morning, Messrs. Cheung (15), Ruffy (15), Leong (10), and in the evening Messrs. Roche Kelly (15), Hodgson (12), Lord (15) and Hornby (15).

Tuesday, Messrs. Roche Kelly (7) and Bankes (12), Weather bad. Wednesday, Messrs. Ruffy (10), Roche Kelly (8), Smith (10), Leong (15), W. E. B. de Whittaker (10), Lord (5), and Mr. Parker (4).

Wednesday, Messrs. Roche Kelly (10), Lord (4), Hornby (15), Parker (10), and Lieut. Rimington (10).

Thursday, Messrs. Cheung (12), Ruffy (10), Roche Kelly (15), Lord (8), and Aoyang (10).

Friday, Messrs. Cheung (10), Smith (8), Leong (10), Virgillio (15), Hornby (5), Gardner (15), Parker (12), and Lieut. Rimington 10.

Saturday, Mr. Ruffy flew for his certificate and obtained same in good style.

Sunday, Messrs. Roche Kelly (15), Smith (15), Lord (15), and Aoyang (10).

British Caudron School.—Monday, last week, school out at 6 a.m. Instructors during week, R. Desoutter and R. M. Murray. Instruction to pupils on 60 h.p. Caudron biplane, Messrs. Legh and Vernham.

Tuesday, school at 5.30 a.m., R. Desoutter trial flight. Instruction on 60 h.p. to Mr. Legh.

Wednesday, Thursday, Friday and Saturday too windy for school work.

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EDDIES.

MR. J. L. HALL is about to add aeroplane designing and construction to his other accomplishments, and has to this end taken some works at Edgware, where, in the near future, work will be commenced on a new machine. Until this is ready Mr. Hall does not wish any details disclosed, but I will go as far as stating that it will be a biplane, and that whilst nothing startling is expected or has been attempted, the new 'bus will be quite a useful, and it is hoped a valuable, addition to the Hall "stable."

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A propos new models, it is to be feared that the Aircraft Company's *début* with an original machine will be somewhat delayed, as the designer, Mr. de Havilland, has been recalled to the R.F.C. Whilst not wishing to criticize the powers that be, and fully aware of Mr. de Havilland's prowess as a pilot, I cannot help thinking that his services as a designer might have been of even greater importance to the country at present than his skill at the control lever. However, his absence does not mean that there is any slacking off in the output of the Aircraft Company, as they continue to turn out their machines at a steady rate. Mr. Birchenough, who has taken over the delivery of the Aircraft Company's machines since Verrier's departure, is kept pretty busy piloting machines, *via* the air, to the authorities. On Saturday, when I saw him at Hendon, he had just returned after delivering one 'bus, and after trying out a new one he was away once more with the second one for that day. That's the way to do it!

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After cultivating the Hendon habit every Saturday afternoon for about three years, I feel perfectly miserable if, by force of circumstances, it becomes necessary to spend Saturday afternoon elsewhere. Up to now the altered aspect of Hendon has not diminished the pleasure to be derived from watching the flying, for although one does not now see any looping, or other "scientific" demonstrations, it is just as good sport to sit and watch the sometimes curious antics of one or other of the large number of pupils doing their first solo flights.

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Last Saturday I received quite a shock whilst having tea with some friends outside the pavilion. Several pupils had been doing "straights" at the dizzy height of about 10 feet, when suddenly a pupil—as we thought—took the bi-rudder 'bus up at an alarmingly steep angle and proceeded to do a straight towards the other end of the ground. On reaching the end of the straight he indulged in a nearly vertically banked left hand turn, and, after completing this, commenced to climb. After reaching a height of some 600 feet he stopped his engine entirely and came down with a series of steep spirals and right and left hand turns, landing a few feet from the railings. Then we gave vent to a sigh of relief, and made our way over to note the identity of so promising a "pupil," to discover that we might have spared ourselves anxiety—it was Merriam!

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I would remind my readers of the little note in last week's issue, asking them to send along any items of a newsy character from friends at the front concerning the work of aircraft, so that they might be reproduced for the benefit of the large number of FLIGHT readers in all parts of the world.

"ÆOLUS."

AIRCRAFT AND THE WAR.

ACTUAL details as to the work which is being accomplished by aircraft in connection with the war are still very scanty, but some of the wounded soldiers who have returned from the firing line tell of the part taken by the German machines in directing artillery fire. Here, for instance, is one characteristic story as related by one of those wounded near Mons to Mr. Hamilton Fyfe, of the *Daily Mail* :—

"In the daytime they had aeroplanes to tell them where to drop their shells. They were flying about all the time. One came a bit too near. Our gunners, a long way behind us, you know, waited and let him come on. He thought he was all right. Two thousand feet he was up, I dare say. We could hear his engine.

"He may have made a lot of notes, but they weren't any use to him or anybody, for all of a sudden our gunners let fly at him. We could see the thing stagger, and then it dropped like a stone, all crumpled up. Good-bye, Mr. Flying Man! That was the end of him."

Another wounded soldier said :

"One of the aeroplanes which had been hovering overhead for some time had apparently managed to give the German artillery our range. We thought the German airmen had been sending back the range by wireless, until a little disc with the distance scrawled on it fell near one of our trenches and gave the show away."

According to another account the German machines signalled the range by dropping or raising a disc suspended beneath the machine.

A report from Ostend on the 27th stated that aeroplanes were utilised to send messages recalling some thousands of German troops stationed in the little villages of Courtrai to reinforce those at Charleroi. On the same day, in a message from Petrograd—to use the new official name of the Russian capital—it was mentioned that the Kaiser, having taken a note out of the Frenchman's book, had been utilising aeroplanes to distribute proclamations, promising Poles protection and undisturbed enjoyment of their own customs and religion.

The following was included in the official wireless message sent out from Berlin on the 28th ult. :—

"The German airship 'Schütte-Lanz' when near Krasnik was vigorously assailed by the enemy without suffering any damage. The vessel remained in the air for 13 hours at Lublin. It was attacked not only by the infantry but by the artillery, and its rear gas cells were struck 25 times by rifle shots. Repairs to the cover of the balloon were carried out during the journey, in the course of which the commander succeeded in making numerous observations. On returning to headquarters the crew, none of whom were injured, were accorded an enthusiastic welcome."

On the 28th ult., Zeppelins were reported to have been seen at Loenstrup and Skaw in Jutland and at Turnhout. In the last mentioned case the dirigible was said to be going in the direction of Antwerp. The dastardly work of the Zeppelin during its raid in the early hours of the 25th ult. has raised a chorus of disapproval the world over, and especially in America. It is a curious and, possibly some people may think, a significant coincidence and omen that among the things which suffered from the bombs were large busts of the Kaiser and of Bismarck, both of which were considerably damaged.

A message from Petrograd on the 29th ult. gave the information that a Zeppelin had bombarded the railway station at Mlava (just over the border of Russian Poland). Being pursued and shot at, it was brought down about five miles from the railway station. There were eight soldiers in the car, with two quickfirers and explosives. A Belgian officer from Malines reported that he saw a German aviator shot while flying, and he concluded from the manner in which the body was subsequently buried by the Prussians that he must have been a man of unusual distinction.

Writing from Paris on the 29th ult., *The Times* correspondent says :—

"The present war has been remarkable for the services rendered by airmen. They have displayed remarkable courage, coolness and resource. General Pau, the hero of the recapture of Mülhausen, has just bestowed the military medal, a coveted decoration for feats of war, upon the airman Gilbert. The latter was flying close to Mülhausen when the stoppage of his engine forced him to descend within rifle range. Happily at that moment his motor restarted, and Gilbert was able to reach the French lines. He had previously thrown all his projectiles, and his machine was riddled with bullets. Wounded in the arm, Gilbert has gone into the hospital of Limoges, but hopes presently to rejoin his duty. Corporal Finck, of the French Air Battalion, who destroyed a Zeppelin and two Taube apparatus by dropping a bomb on their hangar, has been promoted to be sergeant.

"A pilot airman of the Reserve stationed at the aviation centre of St. Cyr, has just accomplished a particularly bold flight of over 400 miles. He flew to the frontier on a new biplane, and has just returned to his base at St. Cyr with the machine riddled with bullets. It had taken part in an adventurous raid in which Zeppelin sheds and their contents had been destroyed."

A message from Amsterdam gives some details of a trip to Brussels by a French airman :—

"On Saturday afternoon, the biplane was at once fired upon by the Germans, but the French pilot twice circled the town, dropping hundreds of pamphlets with the inscription : 'Prenez courage! Délivrance bientôt!' and then disappeared after giving an exhibition of upside-down flying."

On Sunday afternoon five bombs were dropped over Paris from an aeroplane, resulting in the death of one woman, while two persons were injured. The fatality occured in the Rue des Vinaigriers. Two other bombs exploded on the Quai Valmy near St. Martin's Hospital, while the other two which fell in the Rue Marcin and the Rue Recollect failed to explode. According to *Le Temps* a message reading "The German Army is at your gates —you can do nothing but surrender, Lieut. von Heidssen" (? Hiddessen) was also dropped.

Two bombs were also dropped on Tuesday, one falling near the Gare St. Lazare and the other in the Rue Hanovre near the opera house. An attempt was made by two British soldiers to bring the machine down by rifle fire, but owing to the great height at which the German machine was flying their efforts were not successful.

The following despatch from the *Daily Telegraph's* correspondent written from Paris on Sunday throws some interesting side-lights on the work of the French aviators :—

"The aviators with the forces appear to be doing excellent work and to be in great spirits. At one place four aerial reconnaissances had to be carried out daily

over hilly country. On one occasion only one aviator remained in camp, all the others having been despatched on various missions. Without any hesitation he undertook all the work and carried out all four journeys successfully. When he landed for the fourth time he exclaimed, 'I should win the prize. I have flown more than one thousand kilomètres.'

"Like his comrades, Jules Védrines is serving his country, and has been falsely reported shot and wounded in a motor accident. He is, however, well, and has had his machine named 'La Vache' (the cow), the words being painted in great letters. These pilots have found a new game. Each evening after their flights they count the number of bullet holes in their machine, marking each with a circle in red chalk so that none may be included in the next day's total. The record at present appears to be thirty-seven holes in one day, and the pilot in question claims to be the 'recordman du monde.'

"There are others whose work is not so striking as those who dare the enemy's bullets, but which is quite as necessary. They are those who fly to the front with a new machine from the construction and repairing centres, and then bring back damaged machines for renovation."

From Copenhagen on the 30th ult. it was reported that the well-known German airman Post (? Rost) was killed, together with his passenger, as he was leaving Johannisthal to join the army. The machine is said to have been fired at by German soldiers under the impression that it belonged to the enemy. According to the same message the Austrian pilot Rossman, attached to the General Staff, was killed, together with his passenger, on the Austrian frontier, through his machine capsizing and falling from a height of 800 metres. It is further stated that the officer had, during the war, made many successful flights, while on the day of his death the Austrian *Army Gazette* announced that he had been decorated with a high Austrian order.

The Petrograd correspondent of the *Daily Telegraph* quotes from the *Russkoye Slavo* the following account of some *reconnaissance* work by the Russian pilot Kusminsky:—

"I ascended with an officer of the General Staff. At the start we flew along the line of our own army, but then we turned sharply towards the enemy. With us there ascended two other aviators. Each had a different mission, and we soon lost sight of one another.

"According to the orders of our commander, my officer and I had to keep within view of the highway. We flew very high, the barograph indicating between 1,300 and 1,350 metres. At times we went even higher, and it was so bitterly cold that we almost froze. Successful scouting proved to be quite possible, as the air was very clear. Through Zeiss binoculars we could distinguish different portions of the enemy's army, and even identify carts loaded with stores.

"When not far from the Russian frontier, and still at that great height, we suddenly heard an explosion, and the whole apparatus quivered and leapt in the air. We found that the suction valve of the motor had burst. We were saved from destruction by the self-possession of my officer. He kept his head, and did not move a muscle, so that I was able to shut off the benzine and open the contact. We began to descend in a *vol plané*, and to avoid capture by the enemy did our utmost to prolong our flight in the direction of the Russian lines.

"Although we had a very good map we could not tell precisely where we were. At last we touched the ground and saw in the fields not far away a crowd of peasants.

"The officer at once shouted, 'Soak the apparatus with benzine, and get matches ready, so that if they are Austrians we can set the whole thing on fire.' But we had no need to do this, for they were Russians.

"We had come down about three miles within the Russian frontier, and soon a party of our own troops arrived and carried us back to their quarters."

Advices from Amsterdam on Monday stated that a German aeroplane had been brought down at Kameryk. The two officers on board who had dropped bombs on a railway bridge, doing some damage, were made prisoners.

A report from The Hague on Tuesday said that a German biplane flew over Cambrai and dropped bombs in the vicinity of the railway station, destroying the bridge. The aeroplane was fired at and brought down, its two occupants, one of whom was wounded, being made prisoners.

In the fighting last week two German aeroplanes were said to have dropped bombs on the British Camp at Cambrai, but without causing any destruction. A private in the Gloucester Regiment who was wounded at Cambrai saw a German aeroplane bearing the French colours flying over the British troops. He says that until the German artillery fired at it as a test of their range it was not molested, but then it was brought down by British machine guns.

In connection with the naval battle in Heligoland Bight last week it has been stated that information as to the action of the British fleet was conveyed to the Heligoland forts by seaplane,

On Tuesday evening a Zeppelin paid another visit to Antwerp and dropped several bombs, and the following is an official account of the damage done:—"A Zeppelin airship was reported at 10.30 yesterday evening from the forts on the south of the City and on the Nethe River. The airship passed over Alost towards Termonde and Ghent, and then returned towards Antwerp and attempted to fly over the town, but the heavy artillery fire kept it outside the outer fortifications. At 3.30 this morning five or six bombs were thrown from the car. The ship then flew in the direction of ——, where a bomb was dropped near the station. It then proceeded towards ——. Seven bombs were dropped in the Parc du Rossignol, close to some houses where two hospitals were established. The houses, which were flying Red Cross flags, were damaged. Ten or twelve persons were slightly wounded.

"The airship's evolutions took ten minutes. The projectiles were different from those used on the former occasion. The bombs thrown to-day were covered by thin envelopes held together with mushroom-shaped rivets. They were filled with special bullets, calculated to inflict horrible wounds. Such a type of bomb has never been used by artillery, and is completely unknown to them. It is made on the same model as that used by the notorious Bonnot robber band in France."

According to the Rev. Forbes Phillips, writing to the *Daily Express* from Boulogne, the French are now testing a new weapon, for use on aeroplanes, which is said to be more effective than bomb-throwing. "The new fighting aeroplanes are fitted with boxes which are filled with thousands of steel 'arrows.' They are really steel bolts about four inches long. The airmen of war sail over the enemy, and the aviator with a simple device opens trap doors, and the steel contents of the box are distributed on the enemy. The effect upon men in mass or lying in the firing line is deadly, for one of these dropped from 2,000 ft. will go clean through a man."

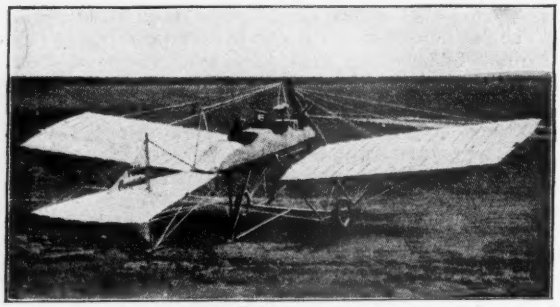
AIRCRAFT "MADE IN GERMANY"

WHICH MAY BE EMPLOYED AGAINST THE ALLIES.

(*Continued from page* 899.)

14. The Fokker Monoplane

is the only German machine of the monoplane type in which the back-swept wings have been employed,



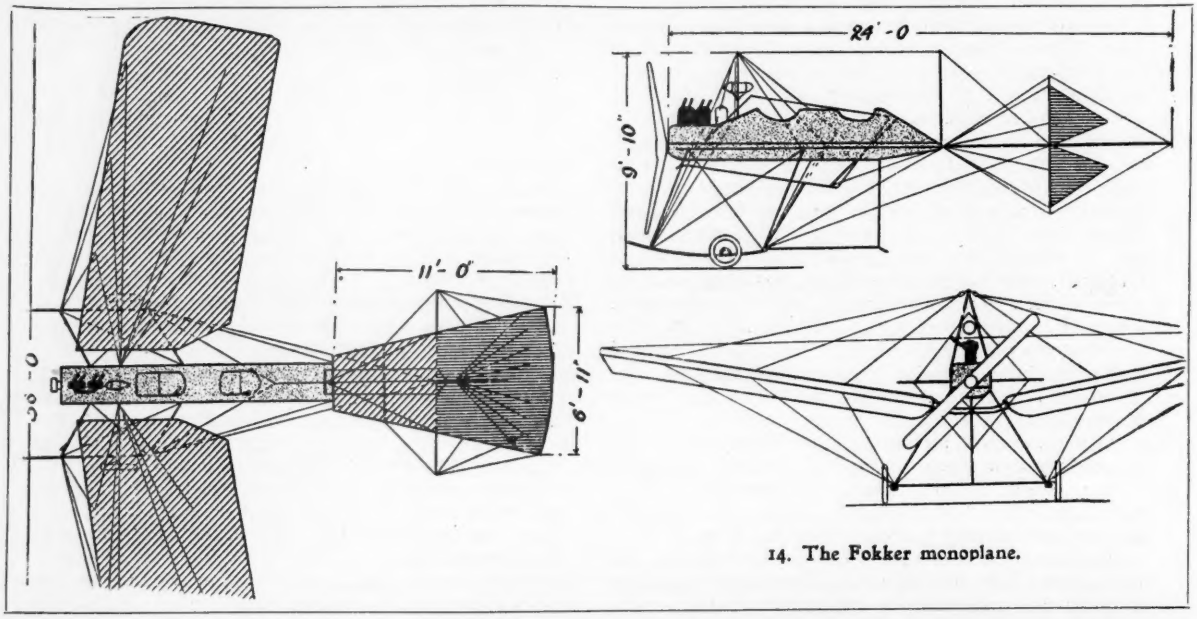
14. The Fokker monoplane.

15. The Goedecker Taube

is characterised by a three-wheeled chassis, and by the absence of any top bracing of the wings, the necessary rigidity being provided by a girder structure of steel tubes below the planes. The wing spars, as in all Goedecker machines, are steel tubes, and provision has been made for quick erecting and dismantling. By substituting a pair of floats for the wheels, this machine can be very quickly converted into a hydro. With a 100 h.p. Mercedes engine its speed is about 60 miles per hour.

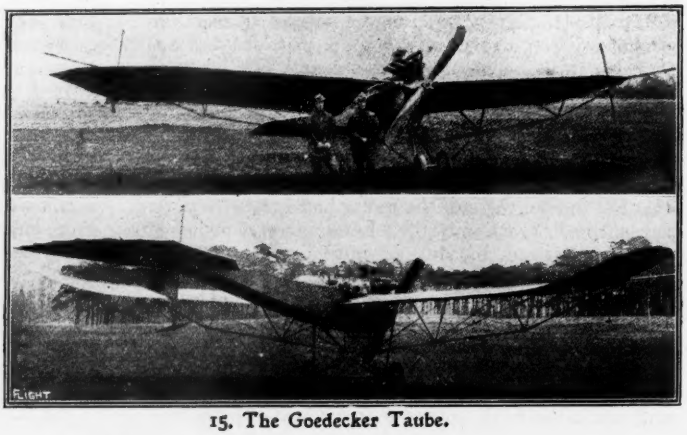
16. The Gotha Taube

does not differ materially in its general lay-out from other monoplanes of this type. The shape and construction of the wings is practically the same as in others, but some slight alterations are to be found in the shape of the *fuselage* and landing chassis. The former, which is of nearly rectangular section, being slightly wider at the

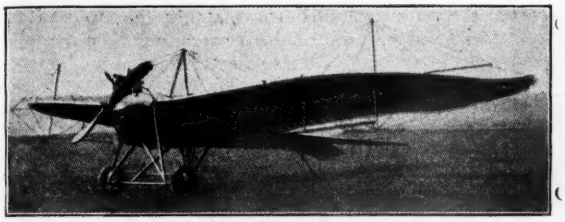


14. The Fokker monoplane.

but the angle of incidence remains the same from root to tip. The *fuselage* takes the form of a short boat-like shell, in which are arranged the tandem seats, the pilot occupying the rear seat. Instead of attaching the wings to the *fuselage* they are secured to the chassis struts, and are set, in addition to their backward slope at a very pronounced dihedral angle. From the accompanying illustrations, it will be seen that the chassis is somewhat complicated and appears likely to become damaged in a heavy landing. Once in the air the machine is practically automatically stable, but as neither warp nor *ailerons* are fitted, it has been found very difficult to land in a wind. In consequence of this it is understood that the design has been modified considerably.



15. The Goedecker Taube.



16. The Gotha Taube.

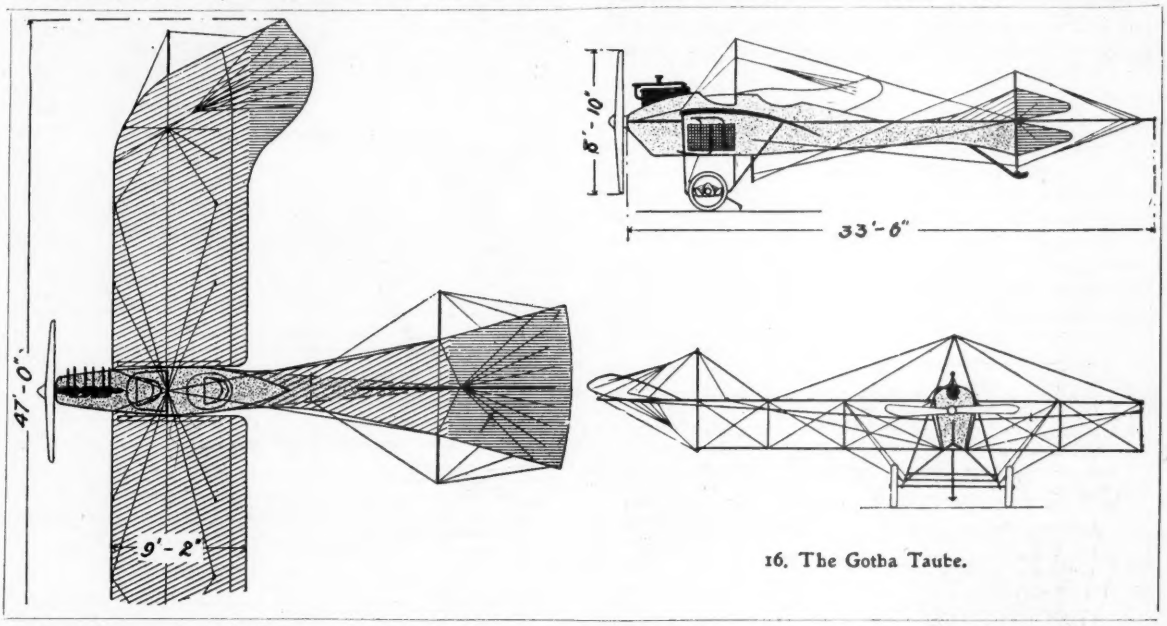
top than at the bottom, is fitted with a comparatively turtle back extending from the nose of the machine to a point some distance behind the pilot's seat. The chassis, although of a simple type, is very strong, and consists essentially of two pairs of steel tubes bent to form a U. A transverse tube connects the rear chassis struts a short distance above and behind the wheels, whilst two other tubes run from the lower ends of the front struts to the keel of the *fuselage* immediately under the engine. With an Argus or Mercedes 100 h.p. engine, the speed of the Gotha Taube is in the neighbourhood of 60 miles per hour. A feature which this machine has in common with a good many others of German origin, is the ploughshare-like brake operated from the pilot's seat. By means of this the machine can be brought to a standstill in a very short space on practically any ground.

17. The New Gotha Taube

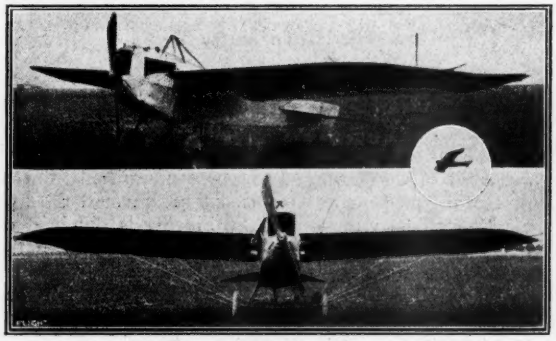
is one of the neatest monoplanes of the Taube type, especially as regards the engine and radiator mounting. Bracing of the wings is effected as in ordinary monoplanes by stranded cables, the upper ones running to a steel tube pylon on top of the *fuselage*, and the lower ones being anchored to the chassis. This is of the simplest form, and offers very little head resistance, as all the tubular chassis struts are of streamline section. The wheel axle is sprung from the chassis in such a manner that the wheels are free to move slightly sideways as well as in an upward direction. For a Taube, the Gotha is unusually fast, developing, fitted with a 100 h.p. Mercedes engine, a speed of 74 miles per hour.

18. The Halberstadt Taube

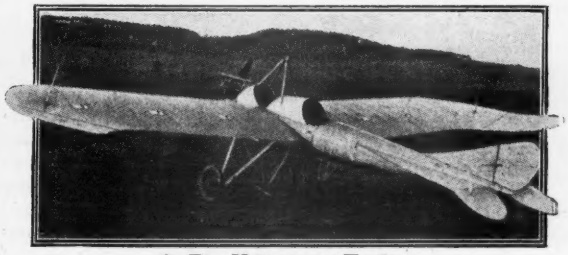
is characterised by a monocoque *fuselage*, covered with fabric inside and out. The main planes are of the usual Taube form, but the girder structure under the wings has been replaced by ordinary cable bracing top and bottom. For purposes of observation, and in order to facilitate photography, openings have been provided in the wings on each side of the observer's seat, and these openings are fitted with glass covers. The chassis consists of two pairs of "V" tubes, from which the tubular axle is slung by means of rubber shock absorbers. The peculiar flexing tail plane found on most Tauben has been replaced in this machine by an ordinary flat non-lifting stabilising



16. The Gotha Taube.



17. The new Gotha Taube.



18. The Halberstadt Taube.

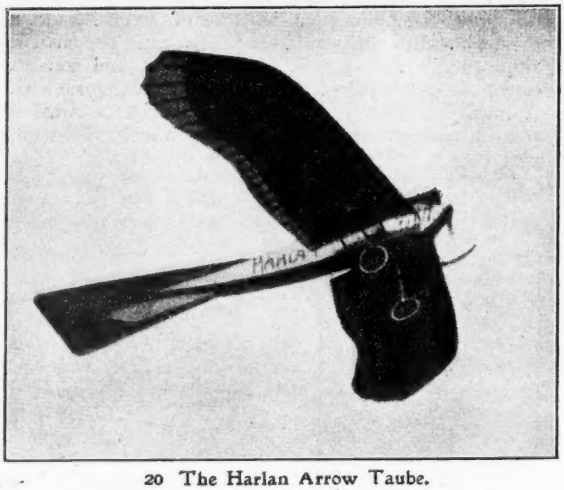
19. The Hansa Taube.

plane, to the trailing edge of which is hinged the divided elevator. Mounted on top of the *fuselage* is a vertical fin of comparatively large area, to the trailing edge of which is hinged the rudder. Evidently the monococque type *fuselage*, and the absence of the usual girder structure below the wing, has reduced the head resistance enormously, for with a 100 h.p. Mercedes engine this machine is said to be capable of a speed of 92 miles per hour.

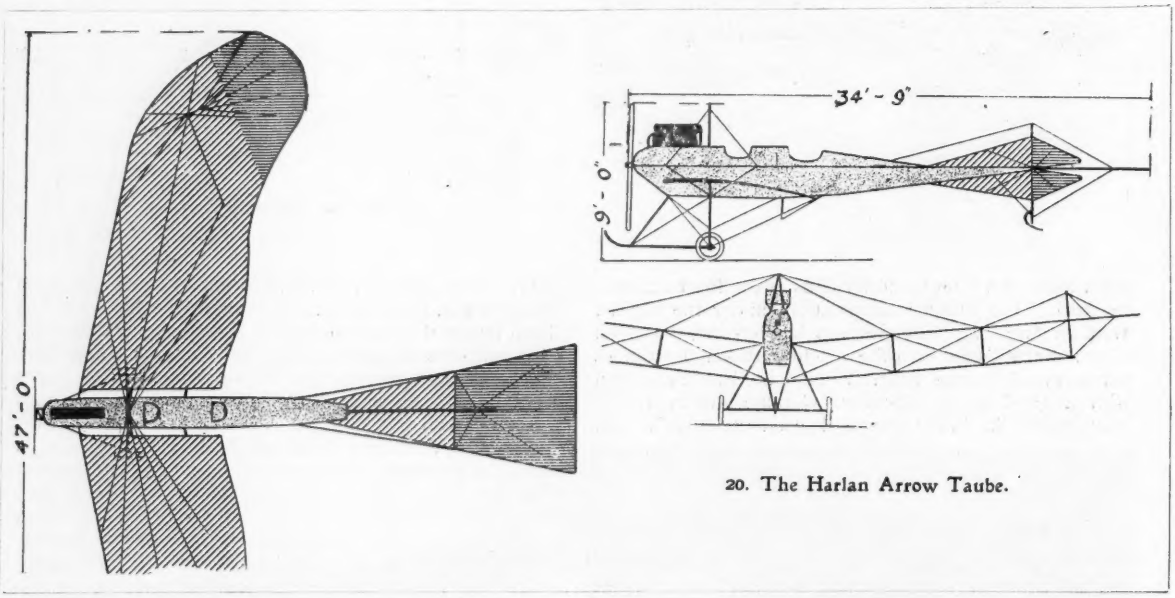
19. The Hansa Taube

differs in no way from the usual form. It has the familiar back-swept upturned wing tips, the flexing tail plane, and the divided rudder working half above and half below the *fuselage*. Seats are arranged in tandem, the passenger occupying the front seat immediately behind the engine. A short turtle back, extending from the nose to a point a short distance behind the pilot's seat, improves the streamline of the front portion of the *fuselage*. With a 100 h.p. Mercedes engine, the speed is 72 m.p.h.

the very deep and narrow *fuselage*, the top of which is fitted with a turtle-back extending from the nose of the machine, back to the vertical tail fin. Openings have been cut out for the cylinders of the engine and for pilot and passenger, whose seats are arranged in tandem. The planes have been left uncovered for a distance of about 1 foot on each side of the *fuselage*, in order to provide a view in a downward direction. The chassis is of the wheel and skid type, consisting of a single central skid carried on steel tubes coming down from the lower



20 The Harlan Arrow Taube.



20. The Harlan Arrow Taube.

20. The Harlan Arrow Taube

combines the back-swept upturned wing tips of the ordinary Taube type monoplane, with the swept back wings of some of the Arrow biplanes. In addition to the backward slope of the wings, these are set at a very pronounced dihedral angle, and are braced in the usual way by means of a girder below the wings. Tail planes of the usual Taube type are mounted on the rear end of *longerons* of the *fuselage* and swept upward in front to protect the propeller. To this skid are pivoted the stub axles which carry the wheels. Springing is obtained by rubber shock absorbers inside the *fuselage*, to which run steel tubes coming up from the wheel axles. With an Argus or Mercedes 100 h.p. engine, and with full load on board, this machine climbs 1,000 metres (3,281 feet) in 15 minutes. (*To be continued.*)

FLIGHT

"THE AEROPLANE OF TO-MORROW."

VARIABLE SURFACE, CAMBER AND INCIDENCE, AND THEIR EFFECT ON SUSTENTATION, SPEED AND SAFETY.

By L. DE BAZILLAC, Engineer, Ecole Superieure d'Aeronautique de Paris.

A WIDE range of flying speeds is rightly regarded as one of the most desirable attributes in an aeroplane because of the benefit derived from the ability to rise from or alight within very restricted areas without necessitating any reduction in the higher limit of speed of which the machine may be capable; and this is especially so in the case of aeroplanes intended for military purposes, since aerial reconnaissance and attack can be more effectively carried out when flying at low speeds.

The problem of high speed flight has, however, in recent times, resolved itself, to a large extent, into one of landing safely, and this tends to become still more difficult as the maximum speed is increased. Hence it is well for us to see whether it is not possible to design an aeroplane having much wider limits of speeds than are at present customary; and in so doing we shall consider the effect of both simultaneous and separate variations in the lifting surface, the camber, and the angle of attack. The slow speed of a machine may, however, also be diminished by the rational use of the second speed of flight.

Variation of the Surface.—The equation for sustentation in horizontal flight is $W = K_y S V^2$, so that if the weight, W, of the machine and the unit lift coefficient of the wing, K_y, are supposed to be constant, the speed for horizontal flight will be reduced to $V \div \sqrt{2} = 0{\cdot}707\ V$ for a surface, S, of twice the area. In doubling the surface, therefore, we reduce the speed by nearly 30 per cent.

Simultaneous Variation of the Angle of Attack and the Surface.—Now consider a machine, the angle of attack of which is 2° at normal speed. From Eiffel's curve for wing No. 3

At 2°, $K_y = 0{\cdot}036$ $K_x = 0{\cdot}0035$
At 6°, $K_y = 0{\cdot}058$ $K_x = 0{\cdot}0054$.

The equations which define horizontal flight are $W = K_y S V^2$. Power expended $= P = (K_x S + \lambda) V^3$, where λ is the coefficient of total passive resistance. If we take into consideration the roughness of the surface, λ includes a term proportional to S, *i.e.* $\lambda = \lambda_0 + \lambda_1 K S$, and K is a coefficient approximately constant, but which is, however, as much greater as K_y is greater, for the same K_x. λ_0 and λ_1 are the coefficients of passive resistance of the body and of the wings, respectively.

Write $\lambda_1 = \frac{K_1 S_1}{K S}$ where S_1 is the equivalent detrimental surface and K_1 the coefficient of normal resistance.

In trebling the angle of attack we have increased the lift in the proportion of 1 to 1·6; and if, at the same time, we double the lifting surface the lift is then increased 3·2 times, and we can proceed at 0·56 of the original speed.

What will now be the power necessary? If we substitute the value of V given in the expression for the lift, in the preceding expression for power expended, we find that

$$P = W^{\frac{3}{2}} \cdot \frac{K_x + \frac{\lambda}{S}}{\sqrt{S} \cdot K_y^{\frac{3}{2}}} = W^{\frac{3}{2}} \cdot \frac{K_x + \frac{\lambda_0 + K_1 S_1}{S}}{\sqrt{S} \cdot K_y^{\frac{3}{2}}}$$

In doubling S and multiplying K_y by 1·6 we have increased the denominator 2·86 times, and in trebling the angle of attack we have multiplied K_x by 1·54. In doubling the supporting surface we have halved λ_0 and diminished $(K_1 S_1)$ because the passive resistance increases at a slower rate than S. Hence we have reduced the power required for propulsion by between 40 and 50 per cent.

We have considered, it is true, only small variations of K_y; but the range of speed obtained to-day with a fixed surface varies to the extent of only about three times the minimum. Further, we have not taken account of the possible variations of the camber, which, in increasing the range of values of K_y and decreasing the speed, decreases also the power necessary. But a very much greater range of power, if required, could be obtained with two motors of unequal power working in conjunction.

However, if we construct a machine capable of augmenting or diminishing its lifting surface, and, at the same time, its camber and angle of attack, it is possible for us to obtain, in ascending flight, and in gliding, a range of variations of the speeds much higher than at present. This we propose to show.

At normal speed, the machine would fly with a reduced surface, and would start and land with increased surface. In this way we obtain the three most favourable conditions of flight:—(*a*) High climbing speed, (*b*) high speed in horizontal flight, (*c*) low speed at the end of a glide.

Ascending Flight.—It is necessary, in ascending flight, in the case of a military aeroplane, to obtain the fastest climbing speed for a given angle of attack, weight, and power.

Let G be the centre of gravity of the machine, W the weight of the machine (supposed to be constant), V the velocity in the line of the flight path, i the angle of the flight-path with the horizontal, H the thrust of the propeller passing through G and directed parallel to the flight-path of the machine. We will suppose this thrust to be constant, that is to say, independent of the variations of the angle of attack and of the speed of the motor, provided that one does not change either the ignition, the admission of the gas or the transmission after the start. This hypothesis is not absolutely exact because of the viscosity, and of the friction of the air on the propeller; in reality, for great decreases in speed, the thrust increases, but one can, without appreciable error, consider it as invariable for the speeds of the motor included within the limits of its power.

If the forces which act on the machine are projected first on the flight-path and then on the normal to the flight-path, (*see* Fig. 1), we can write—

$$H - W \sin i = R_x$$
$$W \cos i = R_y$$

R_x, R_y being the total drag and lift coefficients.

Dividing the right hand side of the first equation by that of the second, and the left hand side of the first by that of the second, we have— $\frac{H}{W \cos i} - \tan i = \frac{R_x}{R_y}$, or, approximately, as i is very small, $\frac{H}{W} - i = \frac{R_x}{R_y}$.

If $H = 0$, $\frac{R_x}{R_y} = i = \gamma$. This is the case of a glide—*i.e.*, during flight when the machine is not under engine power.

If $\frac{H}{W} = \theta$, when $i = 0$, $\frac{R_x}{R_y} = \theta$ where θ is the thrust per unit of weight in horizontal flight.

It is seen by these relations, and referring to the experimental curve showing graphically the variation of the ratio $\frac{R_x}{R_y}$ (Fig. 2) or the curve of inclination, as a function of the angle of attack α measured from the fictitious plane (a plane placed parallel to the wind, when $K_y = 0$) that if $o\alpha = \theta$, $ob = R_x \div R_y$ the magnitude of $i = \theta - \frac{R_x}{R_y} = o\alpha - ob = ab$, is the inclination the machine can attain above the horizontal, with the engine rotating at normal speed.

The gradient will be as much steeper for the same angle of attack as the curve of inclination is more inclined in its power part, from the point with ordinate $o\alpha = \theta$ thrust per unit of weight for horizontal flight. It is necessary, then, to diminish ob from this point, *i.e.* $\frac{R_x}{R_y}$ or $\left(K_x + \frac{\lambda_0 + K_1 S_1}{S}\right) \div K_y$; and the steepest gradient, for the same θ, whatever be the angle of attack, will belong to the machine having the smallest $\frac{\lambda_0 + K_1 S_1}{S}$, *i.e.*, one able to pass from the smallest to the greatest surface (because λ_0 remains approximately

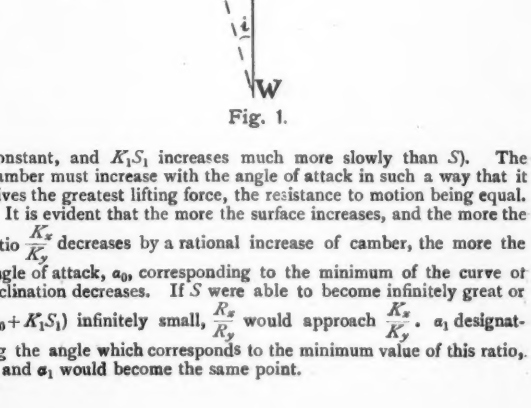


Fig. 1.

constant, and $K_1 S_1$ increases much more slowly than S). The camber must increase with the angle of attack in such a way that it gives the greatest lifting force, the resistance to motion being equal.

It is evident that the more the surface increases, and the more the ratio $\frac{K_x}{K_y}$ decreases by a rational increase of camber, the more the angle of attack, α_0, corresponding to the minimum of the curve of inclination decreases. If S were able to become infinitely great or $(\lambda_0 + K_1 S_1)$ infinitely small, $\frac{R_x}{R_y}$ would approach $\frac{K_x}{K_y}$. α_1 designating the angle which corresponds to the minimum value of this ratio, α_0 and α_1 would become the same point.

Nevertheless, it is not only the slope that matters if one wishes to rise quickly, but the speed of ascent, or the product (Vi); and as, for the same angle of attack, V decreases when i increases, there exists for this same angle (as it is easy to prove, *see* Figs. 4 and 5, and final note) a well-determined surface and camber, which make (Vi) a maximum, and which must not be exceeded. The camber must be, in each case, that which gives the greatest slope. Let α_m be the angle corresponding to the maximum vertical speed of ascent for a given surface. The surface can be increased up to the limit which makes (Vi) maximum at the angle α_m. This limit defines what we shall call the limiting surface.

We shall see that a machine with a surface capable of being increased at the angle of normal speed, and rationally curved for each angle of attack, has also an easier ascent.

The increases in the speed of ascent will be more rapid for the same variation of the angles. This arises from the fact that the vertical speed of ascent (Vi) starts from zero for the normal horizontal speed, and that, whatever be the angle of attack (the velocity of translation being supposed to remain the same as in the corresponding horizontal flight), it is, to the extent of the limiting surface, in proportion to the inclination of the trajectory of ascent, and increases consequently as quickly as the gradient increases. The

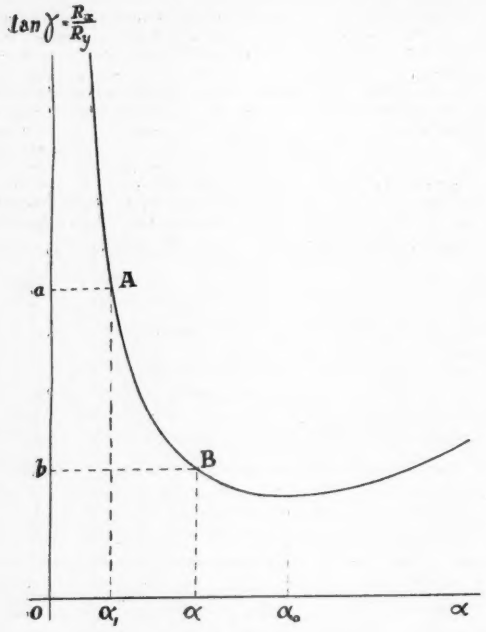


Fig. 2.

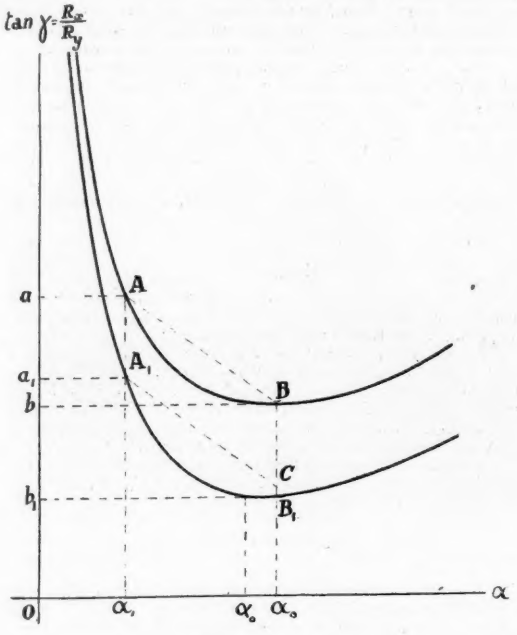


Fig. 3.

Fig. 3 shows by means of the dotted lines the way $A\ A_1\ B_1$ follows by the curve of inclination for a complete augmentation of the surface at the angle of normal speed, α_1. The difference $A\ A_1$ of the ordinates belonging to this angle measures the difference in the thrust of the propeller, or the gradient taken at this angle and arising from the augmentation of the surface. The difference $C\ B_1$ arises from the increase of the camber with the angle of attack. The possibility of increasing its surface and its camber constitutes, then, for the machine, an important reserve of sustentation. This reserve permits it to ascend higher.

complete augmentation of the surface at the angle of normal speed increases then to the extent of the limiting surface, the speed of ascent corresponding to the small variations of angles starting from α_1.

It will be seen that the quicker (Vi) increases the smaller will be the angle corresponding to the maximum speed of ascent.

S is at present constant, since its increase has been made maximum at the angle of normal speed.

(*To be continued.*)

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A British Airman's Grave.

STANDING out from the grim tragedy of war is a pathetic incident, of which the details have been given by Mr. Richard Harding Davis, correspondent of the *New York Tribune*, in a letter written from 10, Clarges Street, W., on August 31st. Mr. Davis writes :—

"Last week in Belgium I saw a wrecked British aeroplane, and beside it the grave of the aviator. At the time I was a prisoner with the Germans, and could not stop or ask questions. Later, with the object of establishing the identity of the aviator, I visited the place. Should after the war the family of the officer desire to remove his body I am writing this that they may know where it is now buried.

"The aeroplane fell close to the road between Enghien and Ath. Belgians near the place told me the officer was shot down by a column of Germany infantry, the strength of which column he was evidently trying to discover. The aeroplane was totally destroyed, but on a twisted plate I found the name of an English firm. There were also in the wreck paper forms for making out reports on reconnaissances. There was no writing on these, but the printed matter was in English.

"At the head of the grave the Germans had put a wooden cross, on which they had written 'Herr Flier, August 22nd, 1914.' The Belgians had covered the grave with flowers. It should not be difficult to find. It is on the left hand side of the road as one walks south from Enghien to Ath in a pear orchard, near a very old red-brick house with a square tower.

"One hundred yards south of the grave is a sign-post that reads, pointing south, 'Ath—14 kil.'; pointing north, "Enghien—5 kil.' Enghien is about thirty kiloms. south of Brussels."

Models

Edited by V. E. JOHNSON, M.A.

Mr. K. Wilson's Model Experiments.

(*Continued from page* 909.)

"THE reason for the model running in this direction was because a gust of wind caught it and turned it round. I could never rely on this model running straight when there was the least wind blowing so I turned my attention to making one that would answer better in the wind. I first made a model glider, 3 ft. span and 5 ins. chord, weighing 1¼ lbs.; the wings were swept back 45°, and it answered very well; so I made a larger one, 10 ft. 6 ins. span and 18 ins. chord, the total weight being 9·5 lbs. and the surface 18 sq. ft. The accompanying photo. is of the model in full flight, the negative tips showing quite plainly. The wind when this photo.

Mr. K. Wilson's large glider in flight.

was taken was blowing fairly strong towards the glider. The machine has no tail or rudder, the only means of control being the negative wing tips, which are, as already stated, well swept back. Nearly all my experiments with this glider were carried out upon a hill some 40 ft. high, the angle at the top being very sharp, and the summit crowned with a number of trees; at the bottom were some houses, with a hill on one side and open ground on the other. The air was very tricky, and I obtained a number of very interesting flights, especially when the wind was blowing over the hills by the side. The glider would fly straight for some 30 yds., and then drop vertically several feet, keeping on a level keel; at other times it would swoop down until within a few inches of the ground, then rise again some 12 to 14 ft., and then glide gently to the ground. Again, there were times when the model was forced down on one side and then again rose to its normal position. When the wind was blowing down hill the model always touched the ground no matter how hard it might be thrown. There are two other things also worthy of note. When thrown into a strong wind the model would often rise 30 to 40 feet above the starting point, and then commence drifting backwards, sometimes head on to the wind, sometimes turning completely round; and, if thrown across the wind (*i.e.*, if it is strong) it often drifted in a slanting direction with its head half turned into the wind.

"The chief material used was yellow bamboo, and all the models were double surfaced. Since the above I have constructed another model of the same type but with greater span, viz., 12 ft. 6 in.; in addition to this I fixed a tail. This tail was attached for an unusual purpose; for instance, it was used for turning the model in any direction without the aid of wing warping or use of an auxiliary rudder. This was done by turning the tail over to one side, *i.e.* putting it an angle of 4° or 5° out of the horizontal, and I may say the model turned without any hesitation whatever; I had no difficulty in getting it to turn three-quarters of a circle of about 20 yards diameter, *i.e.* it turned completely round towards the starting point before reaching the ground from a height of 40 ft. The tail is an expanding one. It can be expanded from 1·5 ft. to 4·5 ft., which gives better control to the machine when turning; again it makes a greater variation in the speed when flying *straight* or for landing purposes. When the tail is expanded the glider will travel 40 to 50 yards further than when it is closed, both launched from the same height of 40 ft. mentioned above."

"Compressed Air" Machines on Wimbledon Common.

A valued correspondent writes as follows:—"Aug. 22nd saw the successful attempts of three members of the Wimbledon Aero Club in making compressed air power driven machines. The machines are fitted with the plant placed on the market by Messrs. A. W. Gamage. A machine thus equipped was seen at the last Aero Show. Those of us who were at the flying trials were very much impressed with the power developed, but owing to the machine being incorrectly elevated the flights ended abruptly through the plant being damaged as the result of a nose dive.

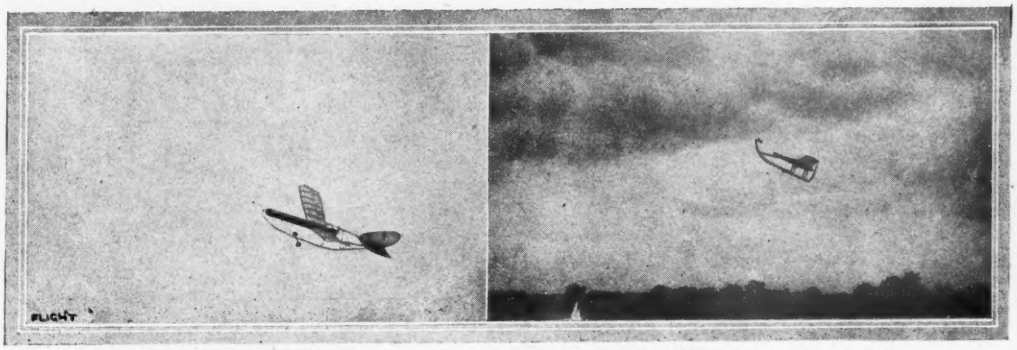
"The successful fitting of the plant to a machine has evidently taken some time and thought, but the trouble in this respect has been safely negotiated by Messrs. Laing, Pavely and Wilkinson.

"Mr. Laing has installed his plant in a tractor. The entire machine is made of bamboo, and it is evident that much time has been spent both in the design as well as in the actual construction. Owing to somewhat boisterous weather prevailing on Saturday afternoon no definite attempts were made to get the machine off the ground. The proper elevating of a tractor necessitates more care than that of a Canard-type model, and rather than risk the chance of a breakage, experiments with this machine were postponed until a more suitable day.

"Unfortunately I was unable to procure a photo. of this interesting machine.

"Mr. Pavely fitted his plant to a machine built after the style of the Mersey. That is, with the propeller between the main plane and the tail. A very clear conception of the general arrangements can be gathered from the photo. (No. 1), thanks to Mr. Conolly's clear photograph.

"Altogether this machine made half a dozen flights. No



Mr. Pavely's model banking. Mr. Wilkinson's model well up.

Compressed air models of the Wimbledon Aero Club.

difficulty was experienced with the engine, the machine getting off every time. The best duration was about 15 secs.

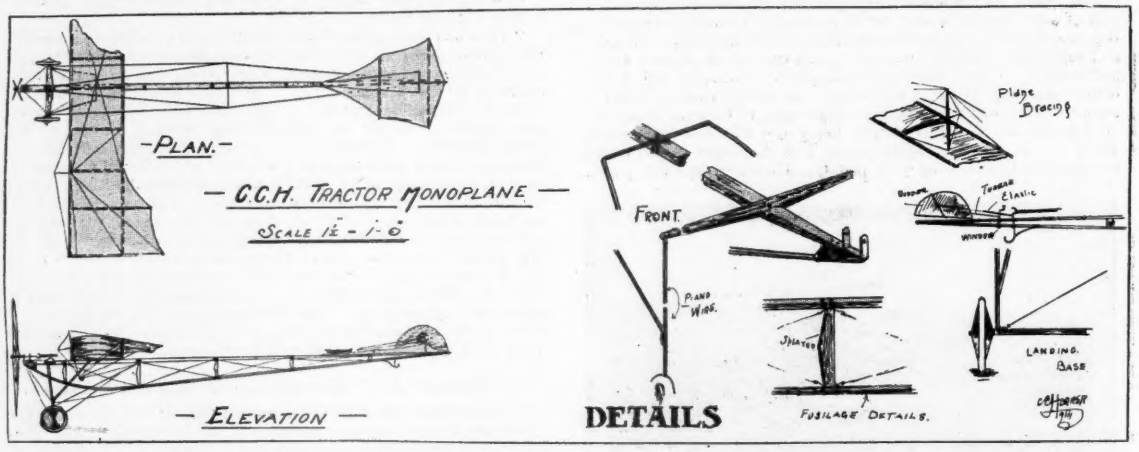
"Once the machine got stalled, but thanks to a very efficient undercarriage no damage was done.

"Passing on to the third machine, that built by Mr. Wilkinson. This machine was very remindful of the old Valkyrie. The chassis is very substantial, and of such a character that no possible damage is likely to occur to the plant itself. The skids are brought right forward to carry the elevator and totally protect the protruding container. The machine is a monoplane of the canard type, as can be seen from the photograph. Many successful flights were made, the best being 21 secs. The machines in general weigh about 22 to 24 ozs., and the loading is about 6 ozs. to the square foot. The general stability was good, and from first experience it would seem that the canard type machine is the most successful to handle. If a supply of this particular type of plant were available it would seem they could form the subject of a very interesting competition. Each having the same power probably the competitor having the biggest duration, *i.e.*, ability to fly at the lowest speed, would of necessity have the most efficient planes, propeller and minimum head resistance. The building of these machines forms an interesting study; they are all built round what may be called the nucleus of the machine. This consists of two *longerons* fastened to the sides of the container, from which spring the chassis, tail and wings."

The excellent photographs were taken by Mr. Conolly to whom our correspondent wishes to acknowledge his able assistance and promptitude in supplying the same.

Mr. C. C. Horner's Latest Tractor Monoplane.

This model is an excellent flyer; average distance from 100 to 200 yds. The propeller generally stops when the model is some 60 to 80 ft. up, when the model will glide down at a small angle covering a good distance during the *vol plané*. The model rises off the ground with the greatest ease. Its stability is good, never having yet sustained any damage; yet Mr. Horner has flown it under very bad conditions. The landing chassis seems unbreakable. All sizes can be scaled off the drawing. Inexperienced model makers should hardly commence on a tractor.



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KITE AND MODEL AEROPLANE ASSOCIATION.

Official Notices.

Competitions.—To-morrow (Saturday) the semi-final round for the Farrow Challenge Shield takes place, and the Hon. Secretaries of the clubs are asked to forward their club's performance, duly signed by themselves and the official observers, to the Gen. Hon. Sec. to reach him by Monday morning.

Michelin Kite Trophy.—This competition takes place this afternoon at Wimbledon, when in spite of the War 7 or 8 teams are expected to compete.

Letter of Thanks from our Affiliated French League.—A letter has been received from the Ligue Française du Cerf-Volant, Paris, in reply to one sent to their league for the kindness extended to our representatives, Messrs. Ingram A.F.K. and M.A.A. and Howkins, during the Boulogne Kite week. It reads as follows:—"Dear Sir,—Your letter of the 7th duly received, and in my name and that of the members of the League, I thank you, as the terms of encouragement of your letter have deeply moved us. We are in heart with you in the terrible trial which we are going through in this moment, and which can only serve to render the friendship greater and more sincere between England and France. Like you we have absolute confidence in the issue of the battles, as we have Justice and civilization on our side; united as they are England, Russia, Belgium and France will drive back the Germans who are making themselves more odious every day. Will you please transmit this letter to all your members the expression of our deep sympathy and great gratitude. A copy of your Association's letter was picked up on the hangar of our Society at Vincennes, and the reading of same gave great encouragement to our members. Many have already left for the war, and the others will soon join them. I thank you again for your kind letter, and grasp your hand cordially. Vive l'Angleterre. Signed (Jacques Howard), on behalf of the Ligue Française du Cerf-Volant, Paris."

Model Competitions.—To be held on Wimbledon Common, Sept. 19th, at 3 o'clock. Entries close on Sept. 12th. The T. W. K. Clarke Challenge Cup (presented by Messrs. T. W. K. Clarke and Co.). Prizes: 1st, silver medal of the Association, and winner to hold trophy for one year: 2nd, silver medal of the Association; 3rd, bronze medal of the Association. Tests: Design; duration. Minimum duration 15 secs. Additional rules governing this competition: 1. Competitors may submit models of any kind. 2. To be awarded to the designee of the machine which demonstrates a device or principal which would be considered of the greatest practical use if applied to a full-size machine. 3. That the surface loading is not less than 4 ozs. to the square foot. 4. Competitors must be at the judges' flag at 2.30 p.m. sharp, any not present at that time may be disqualified.—On Sept. 19th, at 3 o'clock. Entries close Saturday, Sept. 12th. Distance Competition for Single-screw Tractor Models with Enclosed Bodies. Rising off the ground. (Open to the world.) The Weston Challenge Cup (presented by Mr. H. R. Weston, Star Aeroplane Co.). Prizes: 1st, silver challenge cup and silver medal presented by Mr. H. R. Weston; 2nd, silver medal of the Association; 3rd, bronze medal of the Association. Additional rules governing this competition:—1. Models must not weigh less than 8 ozs. 2. Models must have enclosed bodies, whose ratio of width to length must not exceed 12. 3. Minimum loading, monoplanes 4 ozs. per square foot; biplanes 3 ozs. per square foot. 4. Competitors must be at the judges' flag at 2.30 sharp. Any not present at that time will be disqualified.

Laboratory Competition.—All intending competitors should send in their entry forms for this competition at once to Mr. H. Lyche, who will then fix a date for the flying trials, after which the models will be retained and sent to the laboratory. Provincial competitors can make these trials on their own grounds if witnessed by two official observers, who will forward results and see that the models are carefully packed and forwarded carriage paid to the laboratory, and also see that the special fitting for the wind tunnel test is in position; the details of this fitting will be published later. The models must be packed in box ready for tests and tied in with tape to prevent damage, &c., and a card giving number, name, and address must be placed on model.

27, Victory Road, Wimbledon. W. H. AKEHURST, Gen. Hon. Sec.

AFFILIATED MODEL CLUBS DIARY AND REPORTS.

Club reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Leytonstone and District A.C. (14, LEYTONSTONE RD., STRATFORD)

WILL all members note that now we are on the winter season flying takes place from 10 o'clock till 12.45. B section competition, Sept. 13th inst. Viz.: competitors may submit models of any kind. Prizes: two silver medals and hollow spar. Anyone interested in the above club should communicate at 14, Leytonstone Road—Mr. Lamplugh.

Monthly Report.—Splendid work has been done during the month in open competitions of the K. and M.A.A., the majority of prizes coming to the Leytonstone side. On Aug. 2nd, S. C. Hersom did 80's with r.o.g. high flying with good stability. H. Bedford's single-screw hydro got "off" each time but owing to small fin, model had tendency to spiral nose dive, he was also tuning up his 1 lb. hydro, B. Ludlow was acting mechanic. A. Wharmsby was testing r.o.g. with experimental dope, with very good effect, model flying very briskly. Will and Charlie Hersom testing free-wheel propellers in half a gale. Bedford doing 40 with 1-lb. hydro. Others out F. Grattan, B. Ludlow and H. G. Bond. On Bank holiday 14 competitors entered for 3 silver medals given by the Leyton Fire Brigade sports committee Competition was for best flight with 8-oz. models 4-oz. loading. The first six with durations were respectively: H. G. Bond, 85 secs.; H. Bedford, 81½ secs.; T. Kimpton, 81 secs.; F. Hawthorn, 78¼ secs.; W. Hersom, 40⅔ secs.; A. Wharmsby, 40 secs. Officials were B. Ludlow, L. Lamplugh and G. Hawthorn. The first open competition was held on the Welsh Harp, Hendon, Aug. 8th, Mr. Bedford obtaining second, S. C. Hersom third, and H. G. Bond, fourth. Mr. Bond's model was loaded 9 ounces per sq. ft., Mr. Bedford's model was the only one to get off down wind, but was disqualified owing to "rowing" boat being wind side of model. S. C. Hersom's hydro climbed very high but was unstable laterally. Aug. 9th, few models appeared owing to high winds, so members adjourned to club room and had further instruction on the Handley

Page 7 ft. span scale model, driven by steam, twin horizontal engine, driving a 22-inch propeller. This model was designed by H. Bedford and F. Grattan and built by Mr. Midson. Members present were: Mr. Wharmsby, Mr. Ludlow, Mr. Bond, Mr. Lamplugh, Mr. Mason, Mr. W. Hersom, Mr. F. Grattan, Mr. H. Bedford, Mr. Midson, Mr. F. Hawthorn, and Mr. McCulloch. Aug. 15th, several members travelled over to Mitcham Common to compete in the Sir Charles Wakefield competition for 10-oz. biplanes; result being Leytonstone first, second and third respectively; J. Louch, H. Bedford and H. G. Bond. Aug. 16th, Sticker Ludlow was out at 6.30 with Wharmsby, Midson and W. Hersom tuning up r.o.g's. At 10.30 Mr. L. H. Midson had the power-driven H.P. biplane, but owing to the number of spectators it was impossible to let her go, so the attempt had to be abandoned; H. G. Bond flying the Wakefield biplane; A. Wharmsby doing half-mile with his dope r.o.g., with splendid stability; H. Bedford, r.o.g. parachute, obtained 52 secs.; W. Hersom and B. Ludlow acting mechanic on power model. Mr. L. Lamplugh timekeeper with L. McCulloch. Aug. 23rd, brought a member from N.E. London Aero Club, Mr. Burton. At 6.30, L. Midson was tuning up the H.P. power plant, W. Hersom instructing and B. Ludlow timekeeping. At 10.30, in a very high wind, J. Mason was flying his h.l. model, and S. C. Hersom flying his Farrow Shield, obtaining durations of 45 and 94 secs., A. Wharmsby obtaining 35 secs. with r.o.g., L. H. Midson working on his Handley Page biplane. Other members and officials were B. Ludlow, W. Hersom, H. G. Bond, F. Hawthorne and H. H. Bedford. At a special general meeting held at 108, Whyteville Road, Forest Gate, on Aug. 19th, the resignation of Mr. F. Grattan was read by chairman with deep regret. In his speech he said he would like his assistant to fill his place. The assistant sec. was unable to do so, so Mr. L. Lamplugh was unanimously elected. He also wishes to thank the members for the dressing case he received at the meeting. On Aug. 30th, at 6.30, A. Wharmsby was tuning up new r.o.g. for competition same morning. H. Bedford, Farrow Shield model and single screw built-up *fuselage* r.o.g. doing 30 secs., also H. G. Bond timekeeping. At 10.30 showed signs of being misty, with a steady wind. A competition was held for Farrow Shield models under F.S. rules. A great number of spectators assembled, and it was made difficult to get off. The following are the first four, prizes being three silver medals presented by Mrs. Kimpton, S. J. Henley and Mr. Will Kimpton: A. Wharmsby, 52½ secs.; F. Hawthorn, 48½ secs.; H. Bedford, 47¾ secs.; W. Hersom with only one flight, owing to power, 15½ secs. Officials and time-keepers were Mr. Ludlow, Mr. McCulloch and H. G. Bond. Other members were Scout Mason, showing improvements with his h.l., 59 yds. distance, L. Midson and F. Grattan.

Paddington and Districts (77, SWINDERBY ROAD, WEMBLEY).

SEPT. 5th, semi-final of the Farrow Shield; members selected to compete, also reserves, are requested to turn up in force.

Monthly Report.—On Aug. 1st, the Open Competition for the Paddington Cup was held, and resulted in the cup being brought back to the club after a long absence. The models were single-propeller monoplanes, minimum weight 4 ozs., minimum loading 4 ozs., average of three flights for duration. 1st, D. Driver, cup and silver gilt medal, 46½ secs.; 2nd, J. McBirnie, silver medal, 36⅞; 3rd, T. Carter, bronze medal, 33; 4th, R. Bird, 32⅜; 5th, H. Woolley; 6th, W. E. Evans; 7th, F. Honeberg; 8th, J. R. Barrett; 9th, F. W. Johnson; and 10th, M. Levy. On Bank Holiday two competitions were held. The 4 oz. Single-propeller Contest was won by F. W. Johnson with an average of 46⅞ secs.; W. E. Evans, 2nd (best flight, 65); and R. Bird, 3rd. The 8 oz. Twin-propeller Competition was won by W. E. Evans with an average of 76½ secs. Strong wind blowing. Aug. 22nd, members tuning up models of various types—C. C. Dutton and F. W. Johnson 8 oz. twins, A. Rasmussen 6 oz. single, W. E. Evans 5 oz. tractor, T. Carter and H. Woolley also flying. Aug. 29th, the competition for the President's prize was held in ideal weather, and a good muster of members turned out. The models were tractors, minimum weight 4 ozs., average of three flights for duration. Competitors were disappointed at the unavoidable absence of the president, Mr. Alfred Perkins, especially as the competition proved highly interesting. Mr. D. Driver carried off 1st prize, 12s., with the excellent average of 70 secs.; Mr. A. Rasmussen, 2nd prize, 6s.; and Mr. J. R. Barrett, 3rd prize, 3s.; W. E. Evans, close up, 4th; T. Carter, 5th; R. Bird and F. W. Johnson also flew. G. Rasmussen had out an 8 oz. twin-propeller model, which flew well every time, eight flights being 60 secs. or over. He was successful in his attempt to gain his 1st class certificate, making an average of 60⅝ secs. Observers, W. E. Evans and R. Bird. W. E. Evans testing new tubular *fuselage* single propeller model. Two hand-launched flights were made, the durations being 68 secs. and 75 secs. Model was overpowered, the flights terminating in a "spiral pancake." Messrs. W. and A. Woodbridge (new members) are to be congratulated on their maiden flights. The former, with an 8-oz. twin propeller r.o.g. model, built on lines similar to W. E. Evans' Farrow Shield model, obtained 60 secs. hand-launched first time of asking, the flight ending with a long and perfect glide at a good angle. The spar used was a 4-ft. hollow streamlined one of rectangular section in deepest part, and ensures perfect longitudinal stability when once the model is properly balanced. Mr. A. Woodbridge had out a 6-oz. single propeller model, also an 8-oz. twin, both r.o.g. With the former he was not very successful, as might be expected, this type of model not being an ideal one for a novice to commence with. It is rather heavy for its length, 3 ft., but is capable of a fair duration when tuned up. With the latter model, however, some good flights were made, but were not timed. The Bros. Woodbridge bid fair to secure some of the club's prizes at an early date. The secretary is pleased to report that the club's finances are highly satisfactory.

Reigate, Redhill and District (THE COTTAGE, WOODLANDS AVENUE, REDHILL).

Monthly Report.—During August there has not been a great amount of flying owing to weather and the unfortunate circumstances which have been caused by the war, but work has been in progress with new tractors, and very interesting discussions have been held on inherently stable machines, which this club has been following up. Tails and side areas have been discussed, also a great deal has been said about the advisability of interfering with the negative tips for warping on full-sized machines, members being of opinion that the tips should not be interfered with, experiments having been made with flexible and stiff tips on models. As regards side areas, much information has been gained by flying with Messrs. Sutton's and Norton's monoplanes, Mr. Sutton having a comparatively shallow *fuselage*, in relation to depth of rudder, and Mr. Norton a deep *fuselage* under plane. Two inherently stable biplanes are now being built in order to follow up experiments with biplanes. Members think that some recognised rule can be obtained as to relation of side area of front part of machine (taken with varying angle of incidence) to empanage of rudder both for monoplanes and biplanes. Messrs. Key and Hooton are constructing improved monoplanes of the above type. Mr. Key has been flying his 8-oz. r.o.g. mono. with usual good flying. Mr. Norton testing new screws on 8½-oz. r.o.g. mono., also retuning Etrich tractor after overhauling in shop. Mr. Sutton tuning new 8-oz. r.o.g. mono., which promises well, also trying to loop with Handley Page tractor, but found that when inverted it righted itself sideways every time. Mr. Hooton retuning 8-oz. r.o.g. mono. with new power, getting 65 secs. on a cold evening. Mr. Kennard has been out with a new twin-tractor biplane, and has now added extensions to top plane. Messrs. Funnell and Young have also been out.

South-Western Aero Club (373, BRIXTON ROAD, S.W.).

Monthly Report.—Things have been rather slack lately, but despite this members have flown models every night for the last two months. New models have been constructed as follows: D. Prodger, two 3-ft. hollow-spar tractors, average duration 40 secs.; also hollow-spar twin pusher, best duration 70 secs., length 3 ft. All these machines fly in a very satisfactory manner and show good stability. Mr. Peel, hollow-spar twin pusher, Blériot type planes, average 45 secs.; also enclosed *fuselage* canard model, twin gears, 5-oz. loading. This model gave a good deal of trouble when tuning up, having bad longitudinal and lateral stability. The latter was rectified by bending the wing-tips up. Mr. Miller, "A" frame model, 2-ft. span, duration 45 secs. Mr. Clark, h.s. canard model, very stable, and climbs exceptionally fast, average duration 30 secs. Mr. Archibald, 3-ft. "A" frame, 2-ft. span, flies very well. Mr. Kerruish, 10-oz. loading tractor, 3 ft. long, clock-spring chassis, average duration 20 secs. This model flies wonderfully well considering the loading. Mr. Smith, built-up *fuselage* twin pusher canard, weight 10 ozs., average duration 40 secs. Messrs. D. Prodger, Peel, Clarke and Miller have done a good deal of flying after dusk with "sparklers," although this is a somewhat risky procedure on account of the trees which abound in Brockwell Park, the club's "rendezvous." One of the members, Mr. Peel, competed in the "Wakefield" Cup Competition with a 4 ft. 4 ins. long, 2 ft. span biplane, "A" frame, and was placed sixth with 28 marks. This member is now constructing a large Blériot wire-wing machine, which is expected out shortly. A general meeting was held on Aug. 29th, at which it was decided to hold a competition, for a silver cup and engraved knife, on Sept. 19th, 4 p.m., on Wimbledon Common.

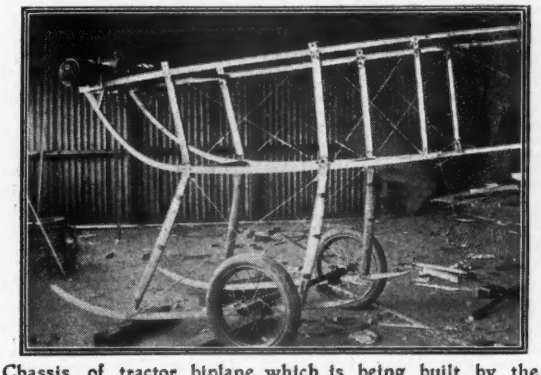
Wimbledon and District (165, HOLLAND ROAD, W.).

SEPT. 5TH and 6th flying as usual.

Monthly Report.—The weather during the last half of the past month has been the most favourable experienced for some time and consequently there has been some very fine flying. The most noticeable feature of the month has been the number of large machines, on one occasion there being 6 of over 5 ft. span out together, three of which were driven by compressed air. Mr. Wilkinson's c.a. machine is a canard, Valkyrie type, 6 ft. span; several short flights were made, the best being 20 and 21 secs. at a good height. An unfortunate nose-dive resulted in a collapse of the *fuselage*, but when this is repaired it is hoped that flights of half a minute will be obtained. Mr. Paveley's machine is of the 0-1-P-1 type, the propeller revolving between the tail booms, the design being similar to the Mersey monoplane. Some 20 flights were made, the duration varying between 15 and 20; when fitted with a larger propeller it flew much better but trouble was experienced with the valve. Mr. Laing's machine is a tractor, 5 ft. 6 ins. span, the wings being tapered and swept back. When adjusted several fine flights were made, the best being one of 31 secs. at a height of 40 ft. Messrs. Tucker, Boniface, Jannaway and Chown expect to have compressed air-driven machines out shortly. Large rubber-driven models have also done well, Mr. Tucker's 30s Martinsyde attracting great attention by its spectacular flights. Mr. Hayden's tractor weight-lifter, double-surface plane, 6 ft. span, has made very good flights, doing 60 secs. carrying a quarter of its own weight and 68 secs. without weights. The climbing and gliding angle is particularly good. On Aug. 1st a competition was held for tractors r.o.g. for prizes of 15s. worth goods presented by Mr. H. A. Lyche, and 15s. worth presented by Messrs. J. Bonn and Co. Mr. Hayden took 1st place with an average of 38 secs., Mr. Boniface 2nd place, and Mr. Tucker 3rd. In the K. and M.A.A. competition at Welsh Harp, on Aug. 8th, Mr. Slatter's 1 lb. hydro-mono. took 1st place, while Mr. Laing's canard biplane came in 4th. There has been a good deal of duration flying in addition to the work done with large machines, Mr. Conolley's twin doing 65's, Mr. Boniface's tractor 50's and Mr. Smith's small machine up to 80. Mr. Powell, with his re-built Olympia twin screw has had 143 secs., and with a small 3-ft. machine 160 secs., both of these flights being at a great height.

Windsor Model and Gliding Club (10, ALMA ROAD.).

Monthly Report.—Nothing of any great interest has happened during the past month, although the usual excellent model flying has taken place. A duration competition was held on Bank Holiday, which attracted a fair number of competitors. Some extraordinary flights were made. On one occasion Mr. F. Camm's model flew right out of sight. The competition was eventually won by Mr. S. Camm with a flight of 85 secs. His model circled rather badly, but gained an immense altitude, finishing with a long spiral glide of 30 secs. Messrs. S. Spicer, E. Stanbrook, J. E. Rogers, W. Rogers and S. Dandridge have also flown. Mr. Stanbrook made a very original D.F.W. type of model, but smashed it during tuning up. A very original model has been turned out by Mr. W. Rogers. It is of the tail-less variety and flies extremely well, and is also one of the neatest models in existence. Work on the full-size machine is proceeding slowly but surely. The wings are now rapidly approaching completion, and make a fine job. The front spar which forms the leading edge is hollow, Farman fashion, while the rear spar is channelled out. It is now certain that the estimate for the complete weight of the machine will not be exceeded. Scale drawings will be shown as soon as the machine is finished. It is rather a



Chassis of tractor biplane which is being built by the Windsor Aero Club.

disappointing fact to record, but it is nevertheless true, that the membership of the club has shrunk to the original members. These few are to be congratulated on having kept on so long, and it is hoped that they will reap a well-deserved reward. Local enthusiasts are reminded that the club is still in existence. The club would be very grateful if any capable fellows in the district would lend a hand.

UNAFFILIATED CLUBS.

Dover Model Ae.C. (1, GUILDFORD LAWN, DOVER.)

Monthly Report.—There has been a good number of excellent flights by the following members: H. D. Davis (twin-mono.), I. C. Macdonnell (twin-r.o.g. and seaplane), C. Sargeant (twin-mono.), J. H. Clark (tractor mono.), and H. T. Holman (tractor mono.) The Northfall Meadow is not now available for model flying, so the meadow at Buckland Farm, by kind permission of Mr. Funnell, was used instead. Mr. Macdonnell's monoplane on one occasion glided for 35 secs., and Mr. Davis's monoplane unintentionally "looped the loop" several times. Mr. Macdonnell, with a model seaplane, once got a flight of 25 secs., a club record. Messrs. C. Sargeant and H. T. Holman have also had good flights with similar machines. Mr. Sargeant has now completed the scale model of the cross-Channel Blériot, intended for the Dover Museum, and it is considered by all those who have seen it to be as fine a piece of work of its kind seen in Dover or elsewhere. The club arranged an informal dinner on Aug. 27th, as several of its members are leaving Dover to take up the aeroplane industry, Mr. Davis returning to the Sopwith Aviation Co. and Mr. H. T. Holman entering the Royal Aircraft Factory at Farnborough. Hon. Secretary, Mr. Ian C. Macdonnell, 1, Guildford Lawn, Dover.

Edinburgh Aero Club (13, HERMAND TERRACE, EDINBURGH).

Monthly Report.—During the month much useful experimental work has been gone through. During the first week members were all busy tuning up machines for the demonstration on the 7th, three meetings being held, many new and original models of all types making their appearance and some splendid flights were made. On 8th, demonstration at Marine Gardens, heavy rain the whole day and a gusty wind. Owing to the small attendance of the public and the weather conditions it was decided to put the meeting off. However, some exhibition flights were made with h.l. models, two of them being carried out to sea and lost, another was rescued by Mr. Saidler, who undressed and swam in for it. It was extremely unfortunate that the weather was so adverse as there was a splendid show of models. Kite flying has become very popular in the club, some very interesting types being seen. On 15th, owing to wind no model flying, but Messrs. Harrison and Calder out at Meadows with Caudron biplane (scale) which flies very well with two strings and caused some excitement round about; when the strings are slackened this kite does some lovely glides. On 22nd, meeting at Meadows, only a few members present, Mr. Watt flying a Bragg-Smith-type biplane and h.l. twin-prop. mono., Mr. Hartley doing loops with single-prop. mono. On 29th, at Inverleith, Messrs. Harrison, Calder, Hartley, Thomson and Ramsay; Mr. Harrison flying a single-prop. r.o.g. mono., which climbs very fast, a single tractor mono. h.l. and single-tractor mono. r.o.g., which both fly well. Mr. Ramsay some good flights with a new h.l. twin-prop. mono., including one of over 60 secs. duration. The club, like many others, is being affected by the war, several members having answered the call and others about to follow.

Hove Aero Club (4, BROOKER STREET, HOVE).

Monthly Report.—Aug. 5th, tractor competition cancelled owing to high wind. Hamilton beat the club's low duration record with 27 secs. The club's first contest, over pond flying, resulted with Allen 1st, Hamilton 2nd, Sanderson 3rd. Hamilton again beat the record on the 7th, with 35 secs. On Aug. 12th a distance competition was held, and on 19th cross-country race.

Liverpool Aero Research Club (62, CEDAR GROVE, LIVERPOOL).

SEPT. 5TH, Breckside Park; Sept. 8th, general meeting, Cedar Grove.

Monthly Report.—It was decided at the general meeting, Aug. 11th, to affiliate with the Kite and Model Aeroplane Association next January. July 28th, at Clubmoor, T. W. Bennett, big-hawk kite, 2,000 ft., B. Tear doing excellent work with "arrow-plane" 1-1-0-P2, G. H. Kilshaw trying Etrich at altitude flying. July 30th, at Lister Drive, T. W. Bennett doing 40 secs., G. H. Kilshaw winding up with a fine flight close on 150 ft. high, 41 secs. Aug. 1st, at Sefton, T. W. Bennett, with 8 ft. 6 in. bird kite, 1,500 ft. high, and flying back-swept 1-1-0-P2. The meeting at Stanley, Aug. Monday, had to be postponed, members being informed on arrival that flying would not be allowed, the arranged duration competition having to be postponed. F. Lowe, J. Connolly, H. Clark and G. H. Kilshaw adjourning to Clubmoor and flying 1-1-0-P2's, the latter making a 20 sec. flight with covered-in *fuselage* r.o.g. biplane canard. 8th, T. W. Bennett with h.l. canard, and doing a very fine flight with r.o.g. 0-1-1-P2. 13th, Lister Drive, B. Tear doing fine flights on Dunne plane 1-1-0-P2 and washed-out wing model. G. H. Kilshaw, with old veteran 4-ft. r.o.g. tractor mono., making a single short flight, mishap on landing too steep. W. Beale flying 1-1-0-P2, and T. W. Bennett having ½-size Cody man-lifting kite and box-wing kite up to 3,500 ft., his best this season, also flying midget canard. 15th, at Clubmoor, B. Tear doing some fine steady 80 ft. high flights and tuning up a promising duration 1-1-0-P2. G. H. Kilshaw with h.l. Etrich canard usual good flights and large r.o.g. tractor. 20th, at Lister Drive, B. Tear, 30 secs., with wash-out wing-tip twin-canard, and 25 secs. with h.l. single-screw canard (built-up frame). G. H. Kilshaw, flying Etrich twin-canard, 30 secs.; J. Connolly out with new twin-pusher mono., and F. Lowe doing 20 secs. with promising h.l. canard; F. W. Bennett flying back-swept 1-1-0-P2 good altitudes 30 secs. 22nd, at Breckside Park, following members making an extremely busy display with 1-1-0-P2's:—T. W. Bennett, 32 secs.; F. Lowe, 20 secs.; B. Tear, 29 secs.; J. Connolly, 22 secs.; G. H. Kilshaw, 32 secs., first and last-named with 0-1-1-P2 r.o.g. and twin covered-in *fuselage* r.o.g. biplane respectively. 27th, at Lister Drive, B. Tear's two 1-1-0-P2's usual good flights; J. Connolly looping the loop in fine style; L. Shone and F. Lowe out with 1-1-0-P2's, latter getting fair durations at good heights; G. H. Kilshaw out with new 1-1-0-P2 looping the loop, and also 4-bladed tractor r.o.g. mono., a very slow-speed model 30 ins. span. 29th, at Lister Drive, the following:—T. W. Bennett, 1-1-0-P2 (back-swept), 42 secs.; B. Tear, 1-1-0-P2 (negative tips), 30 secs.; F. Lowe, 1-1-0-P2 (negative tips), 25 secs.; L. Shone, new 1-1-0-P2, 20 secs.; G. H. Kilshaw, ordinary 1-1-0-P2, 42 secs., and negative-tip 1-1-0-P2, 38 secs.; J. Connolly, 1-1-0-P2 (negative tip), 25 secs.

S. Eastern Model Ae.C. (154, PECKHAM RYE, S.E.).

SEPT. 5TH, Lee Aerodrome 2.30 to 4.30 p.m. Sept. 6th, Blackheath, 7.30 to 10 a.m.

Monthly Report.—During the last month the S.E.M.Ae.C. members have accomplished some very useful work, at the Lee and Blackheath Aerodromes. Several new members have been enrolled, and are progressing exceedingly well, under the guidance of the more experienced members. Several new machines have been produced lately, a large proportion of them are of the geared motor variety. Mr. W. Entecott (who is a recruit to model aviation) has come along wonderfully. His r.o.g. A-frame, has executed flights, during the course of which, quite respectable altitudes were attained, his latest production being a very neatly designed r.o.g. single propeller geared monoplane. Mr. W. McLaughan has also been in evidence with a small stud of single propeller machines. A small speedy tractor monoplane of the type "Morane-Saulnier" with a covered in *fuselage*, and a r.o.g. single propeller monoplane have kept Mr. R. W. Prance very active of late. The r.o.g. has been constructed for the coming competition. A large tractor biplane is expected to make its début very soon, under the control of Mr. A. F. Chinnery. A notable feature worth mentioning is that of a 2-oz. single propeller model flown by Mr. Chinnery, one of the original 2-oz. machines constructed by Mr. A. B. Clark over two years ago. Mr. G. Brown has carried out numerous flights with a geared r.o.g. single-propeller monoplane. He is also directing his energies to power-driven models, and is now hard at work on a biplane, of the Henry Farman-type, propelled by a steam plant, on the same lines as those constructed by Mr. H. H. Groves. Single-propeller monoplanes (which appear to find favour among the members) have been demonstrated by Mr. A. B. Clark and Mr. T. W. Edwards. A weight-carrying machine, r.o.g. twin-propeller, has been exercised by Mr. A. D. Nicholls. Several experiments with a Dunne-type glider have been carried out by Mr. F. Dixon and other members of the club. The glider was released by a special method, from a box kite, to ensure obtaining a lengthy glide for observation purposes. Good results have been obtained by Mr. L. Hatfull and Mr. Attwoll with tractor monoplanes, the latter's model being very lightly loaded, and achieving flights of 35 secs. duration. The rules for the S.E.M.Ae.C. July-Sept. competition, Sept. 26th, are as follows:—1. This competition shall be open to members of the South-Eastern Model Aero Club only, and is for 2. Single propeller models capable of rising off the ground entirely under their own power. 3. This power may be any suitable means devised by the competitor and may be changed, repaired, or otherwise altered as often as is necessary. 4. The model, with the exception of wheels and propeller, must be of the competitor's own construction. 5. Models must alight on the chassis at the termination of one official flight and remain in a proper upright attitude for five minutes. 6. Competitors pushing or otherwise assisting their model to rise will be disqualified. 7. The official flights will be held on Sept. 27th. If time permits three flights will be allowed each model. 8. At the completion of these flights models must be undamaged. 9. Competitors must be responsible for all damage done by or to their models. Efficient protectors must be fitted. 10. Competitors may enter any number of models. 11. The winner will be the entrant whose model attains the greatest duration of flight. 12. These rules may be amended or otherwise altered at the discretion of the judges, who will be three non-competitors. Entry forms and any further particulars can be obtained from the hon. secretary Mr. S. E. Grimstone, 154, Peckham Rye.

Southend, Westcliff and Leigh Model Aero Club (96, VALKYRIE ROAD, WESTCLIFF-ON-SEA).

THE winter programme is starting shortly, a great feature is to be social evenings and mutual aid in construction, the secretary being in a position to offer the use of a workshop on specified evenings. New members will be welcomed.

Monthly Report.—On account of members being on holiday, very little flying has been accomplished.

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Cellon's Telegraphic Address.

BY a printer's slip, the telegraphic address of Messrs. Cellon, Ltd., was incorrectly given in their announcement in last week's FLIGHT, and in order that there may be no uncertainty on the point, it may be stated that it is "Ajawb, Stock, London."

German Pilots Shot as Spies.

A REPORT from Copenhagen states that on Saturday, Hellmuth Hirth, one of the best of German civilian pilots, was shot in Berlin as a spy. Suspicion is said to have fallen upon him because of his acquaintance with Garros, with whom he had been in correspondence since the outbreak of war. It may be recalled that Hirth recently bought a Morane monoplane, which he entered for the London–Paris–London race, although he was unable to get away.

It has also been again reported that Herr Wiener, one of the directors of the Albatros firm, and Herr Thelen, the Albatros pilot, have been shot for selling aeroplanes out of the country.

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